XENION® HELION® Surgical Lighting System

Service Manual

TRUMPF

To the Service technician,

Please read through this service manual with great care and comply with the safety information and requirements for servicing.

CE marking

CE 0123

This item of equipment is a Class I medical device as defined by the European Medical Device Directive (MDD) 93/42/EEC, June 1993, Appendix IX.

Conformity

The manufacturer declares that this product conforms to the fundamental requirements according to MDD Appendix I and documents this by means of the CE marking.

What equipment forms the subject of this service manual?

The surgical lighting system with the following variants:

- 1 to 4-fold suspension with the following types of lamp:

HELION® with halogen lamp:

- HELION S; HELION M/M+; HELION L/L+.

XENION® with metal vapour lamp:

- XENION M/M+; XENION L/L+.

And the following optional equipment:

- TFT flat screens 15“ and 19“,
- HELION M/M+; L/L+; XENION M+ with fixed focus camera.
- TruVidia camera system.

Technical Customer Service is at your disposal,

- if you have any questions on disassembly, repairs or settings, or
- if you would like to re-order spare parts.

How to contact us

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1 Important Information for the Service Technician

1.1 Information for the service technician

Only for trained and authorised fitters

This service manual is intended only for service technicians trained and authorised by TRUMPF KREUZER Medizin Systeme GmbH + Co. KG.

Servicing in accordance with this service manual

- Servicing must be carried out in steps according to this service manual.

Use original parts only

- The safety, reliability and performance of the equipment is only ensured where TRUMPF KREUZER original parts are used.

In case of problems

- If, when dismantling, making repairs or settings, you encounter problems which are not covered by this service manual or not covered in sufficient detail, you should immediately contact your nearest TRUMPF KREUZER Customer Service Centre for your own safety and that of the hospital staff and patients. Only carry out repairs that you are familiar with from your training and which are included in this service manual.

Defective parts

- Replace any defective parts with TRUMPF KREUZER original parts.

Repairs outside the scope of the repair order

If it should be necessary to replace parts outside the scope of the repair order, discuss this work with the customer first.

No unauthorised or temporary repairs

- Unauthorised or temporary repairs are not permitted even if requested by the customer.

Comply with all the requirements from the current laws, regulations and standards.

- For information and to order spare parts please contact TRUMPF KREUZER Service (Telephone: +49 / (0) 180 / 225 4135).

1.2 Tools and equipment required

- Basic equipment:
- fitter's tool set,
- cordless screwdriver

- Measuring instruments:
- luxmeter (for measuring light intensity),
- voltmeter (for making electrical measurements).

- For fitting/dismantling heavy components:
- Lifting equipment with a permitted load of at least 200 kg. The lift must correspond at least to the height of the ceiling.
- Ladder with necessary length.

- Accessories:
- cable ties

1.3 Proper servicing

Observe the following rules when carrying out service work:

Check the installation position of the cables
- Put the cables back in their original installation position. Check the cables when positioning the lamp etc. to ensure they are not severed or squashed.

Installing safety devices
- Install or renew all safety devices such as covers, cable ties, cable holders, cable shields, ground, equipotential bonding and earth connections.

Before the functional check
- Check cables that have been detached or been renewed against the circuit diagrams in this service manual to ensure they have been properly connected.

Check the PE connections
- Check that the earth connections comply with the current standards in your country.

Carry out functional check
- Carry out a functional check according to Chapter 14: “Functional Check, Hand-Over and Customer Instruction”.

1.4 Warranty and liability

TRUMPF KREUZER Medizin Systeme GmbH + Co. KG assumes no liability for the reliable and proper functioning of the surgical lighting system if:
- installation, modifications and repairs are not performed by TRUMPF KREUZER service technicians or persons authorised by TRUMPF KREUZER.
- The electrical installation of the respective equipment does not comply with the regulations currently applicable.
- The surgical lighting system is used other than for its intended purpose as stated in the operating instructions.

1.5 Disposal

- Please dispose of the packaging materials according to the applicable guidelines for disposal.
- Observe that it is compulsory to recycle removed components, particularly electronic components and cables.

2 Your Safety is Important to Us

2.1 Symbols used in this service manual

Important information is shown in this service manual and on the equipment using symbols and key words.

Signal words such as DANGER, WARNING or CAUTION indicate the level of risk. This is visually emphasised by the different triangle symbols.

The signs have the following meanings:

DANGER	Failure to comply will certainly result in severe or even fatal injury.
WARNING	Failure to comply may result in severe or even fatal injury.
CAUTION	Failure to comply may result in minor or moderate injury or damage to property.
NOTE	Offers tips on usage and handy information.

Electric shock	Danger of an electric shock which may result in severe or even fatal injury.
Falling load	Danger of a falling load when in the installation area under a light system or following incorrect installation.
Sudden release of spring arm	Danger of sudden release of the spring arm when dismantling the lamps.
Biohazard	Danger of infection due to the lighting system not being cleaned and disinfected.
Laser radiation	Danger of eye damage due to the optional laser (Class 2) in the central hand grip.
Danger of tripping	Danger of tripping and falling over tools or components in the hospital staff's path.

2.2 Symbols on the equipment

	ATTENTION! Comply with operating instructions.
CE 0123	CE conformity marking with number 0123 of notified body.

2.3 Overview of the most important safety information

Hazards from electric shock

DANGER – power supply and emergency power supply:
During all servicing the building power supply and the emergency power supply must be de-energised all-pole disconnection and prevented from being switched back on again.

DANGER – Electric shock - High voltage 300 V:
The ballast in XENION lamps produces a starting voltage of 300 V:
When carrying out measurements in the lamps and when the power is switched on:

- cordon off the installation site,
- avoid all contact with conductive parts.

Falling lighting system parts

DANGER – Falling lighting system parts:
During servicing it is not permitted to stand under the lighting system.

Sudden release of spring arm

WARNING - Sudden release of spring arm:

- The spring arm is under high tension. If the lamp is not removed in the uppermost spring arm position, the spring arm releases suddenly, springing upwards, and can cause serious injury.
- Only dismantle the lamp when the spring arm is in the uppermost position.

Eye damage due to the optional laser

WARNING – Laser radiation (LASER CLASS 2) -
Do not look directly at the beam from the central hand grip:
Laser radiation does not constitute a danger to persons who are not anaesthetised, due to the blink reflex.
Nevertheless, to avoid damaging your eyes you should not look directly at the laser beam.

2.3 Overview of the most important safety information (cont'd)

Failure of the lamps during an operation

WARNING – Failure of the spare lamp:
Always change both lamps. When replacing the lamp always replace the entire lamp unit.
In the case of HELIUM models, the lamp base must also be replaced.

Damage to components of the lighting system

CAUTION – Damage to lamps:
Handle and insert new lamps by the packaging film/using a soft cloth only.

Before initial operation of the lighting system

WARNING – Malfunction:
Before the initial operation of the lighting system the electrical supply has to be checked and approved by qualified staff.

WARNING – Risk of infection:
Ask a doctor about the possible risks (e.g. hepatitis B) of being a service technician.
After consulting a doctor, get yourself vaccinated against hepatitis B. A booster is required every 10 years.
Disinfection of the equipment must be organised in good time before servicing and must be carried out by the operator.

- Servicing must only be carried out on lighting systems which have been cleaned and disinfected,
- Comply with hygiene guidelines concerning cleaning, disinfection and clothing,
- Only work in the operating theatre with the permission of the user,
- Observe the code of practice in force at the medical facility, particularly in the operating theatre,
- If you have any symptoms, consult a doctor immediately. Inform your doctor that you have worked in hazardous areas – even after several months.

WARNING – Wear protective eyewear:
Wear protective eyewear in case of a possible risk to eyes, in particular when carrying out the following work:

- hammering pins or similar components in/out,
- removing tensioned springs and fuses,
- when drilling,
- when soldering,
- when using solvents, cleaning agents or other chemicals.

CAUTION – Tripping and falling:

- Put dismantled components or tools somewhere that nobody can trip and fall over them.
- Keep your work place clean and tidy during and after servicing.

4 Table – Troubleshooting and Possible Remedies

Fault	Possible causes	Possible remedy	Section
LED lamp indicator lit up	Lamp defective	Change lamp	5
Luminous field too small/ luminous intensity too low	Maladjusted limit stops	Adjust luminous field	6
Noises in the light head	Loose parts in the light head/focus unit	Check light head/focus unit/ replace filter glass assembly or defective parts	7 ff.

HELION light head	Possible causes	Possible remedy	Section
Inconsistent, off-centre luminous field with HELION M / M+/ L / L+ only	Servomotor polarity incorrect/ servomotor defective	Check polarity of servomotor/replace focus unit	8
No light	No input voltage	Check building power supply	9.1
	Mains fuse of building power supply defective	Check mains fuse at automatic circuit breaker	9.2
	Electrical connections for lamp, cardanic suspension, spring arm or extension arm interrupted	Check internal electrical supply lines of lamp, cardanic suspension, spring arm or extension arm	10
	Defective sliding contact in extension arm	Replace sliding contact in extension arm/check slip ring on central column	10.1 10.2
	Defective cable in light head/cardanic suspension	Check/replace internal electrical supply line in light head/ replace cardanic suspension	10.3 10.4
	Defective cable in spring arm	Check/replace internal electrical supply line in spring arm	10.4 10.5
	Defective cable in extension arm	Check/replace internal electrical supply line in extension arm	10.6 10.7
	Defective slip ring on central column	Replace slip ring on central column	10.8 10.9
	Contact areas burnt/damaged	HELION M / M+ / L / L+: Check operating voltage on focus unit/replace unit	11.1 12.1
	Line contact on PCB in light head defective/ PCB defective/fuse on PCB defective/cables in light head defective	HELION M / M+ / L / L+: Check positioning of cables on PCB and control panel/ replace PCB/replace lamp supply lines	11.1 12.1
	Line contact on PCB in light head defective/ PCB defective/fuse on PCB defective/cables in light head defective	HELION M / L: Check positioning of cables on PCB and control panel/ replace PCB/replace cables in light head	11.2

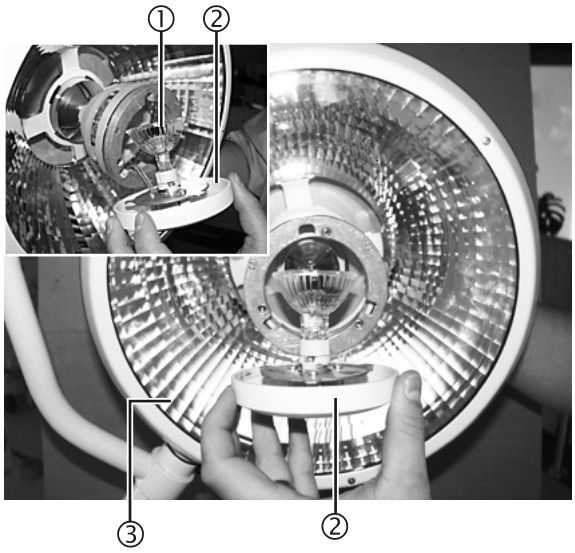
4 Table – Troubleshooting and Possible Remedies

Fault	Possible cause	Possible remedy	Section
No light	Line contact on PCB in light head defective/ PCB defective/ fuse on PCB defective	Check positioning of cables on PCB and control panel/ replace PCB/replace fuse/ replace cables in light head	12.2
	Line contact on PCB in light head defective/ PCB defective/ fuse on PCB defective	Check positioning of cables on PCB and control panel/ replace PCB/replace fuse	13.1
No dimmer function	Line contact on PCB/control panel in light head defective	Check positioning of cables on PCB and control panel	13.2

4 Table – Troubleshooting and Possible Remedies

XENION light head			
No light	No input voltage	Check building power supply	9.1
	Mains fuse for building power supply defective	Check mains fuse at automatic circuit breaker	9.2
	Electrical connection for lamp, cardanic suspension, spring arm or extension arm interrupted	Check internal electrical supply lines for lamp, cardanic suspension, spring arm or extension arm	10
	Defective sliding contact in extension arm	Replace sliding contact in extension arm/check slip ring on central column	10.1 10.2
	Defective cable in light head/cardanic suspension	Check/replace internal electrical supply line in light head/ replace cardanic suspension	10.3 10.4
	Defective cable in spring arm	Check/replace internal electrical supply line in spring arm	10.4 10.5
	Defective cable in extension arm	Check/replace internal electrical supply line in extension arm	10.6 10.7
	Defective slip ring on central column	Replace slip ring on central column	10.8 10.9
	Contact areas burnt/damaged	Check operating voltage at focus unit/replace unit	13.1
	Line contact on PCB in light head defective/ PCB defective/fuse on PCB defective/cables in light head defective/ballast defective	Check positioning of cables on PCB and control panel/replace PCB/ replace fuse on PCB/ replace cables in light head	
The halogen lamp does not light up when switched on	Halogen lamp defective/no power supply available	XENION L / L+ only: Replace lamp/check voltage of electronics	13.1 5.4
Only the halogen lamp lights up	Metal vapour lamp defective/power supply to electronics too low/high	XENION L / L+ only: Replace lamp/check LED indicator on the electronics/check voltage	
No dimmer function	Line contact on PCB/potentiometer/ballast in light head defective	Check positioning of cables on PCB/potentiometer/control panel/replace potentiometer	13.2
Dimmer functioning incorrectly	Reversed potentiometer polarity	Change potentiometer polarity	

Figure 01



5.1 Changing the lamp of the HELION S

The lamp does not light up.

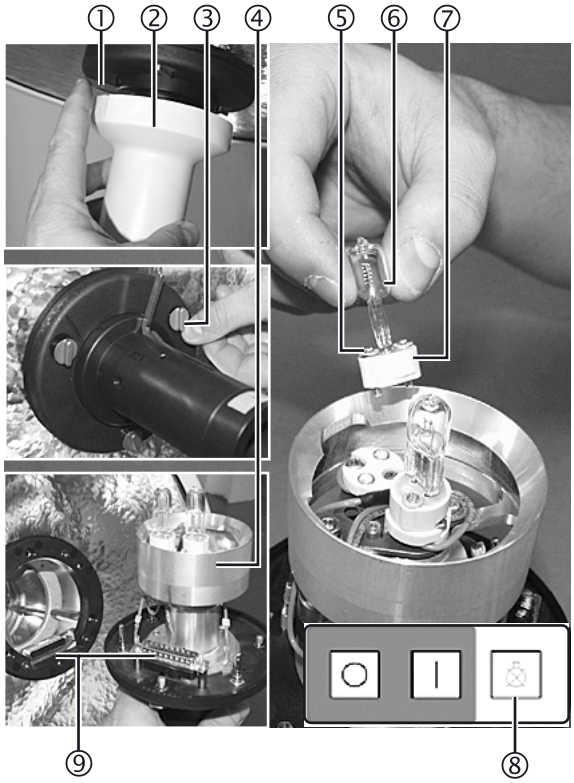
Removal:

1. Carefully turn the lamp holder ② and remove it from the HELION S lamp ③.
2. Carefully remove the old lamp ① from the lamp holder ② and dispose of it in the appropriate manner.

Installation:

3. Fit the new lamp ① holding it by the packaging film/using a soft cloth and fit the components as described above, but in the reverse order.

Figure 02



5.2 Changing the lamp of the HELION M/ M+ / L/L+

The display ⑧ is lit up. The lamp is defective.

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.

WARNING – Failure of the spare lamp:

- Always change both lamps.
- When replacing the lamp always replace the lamp base too.

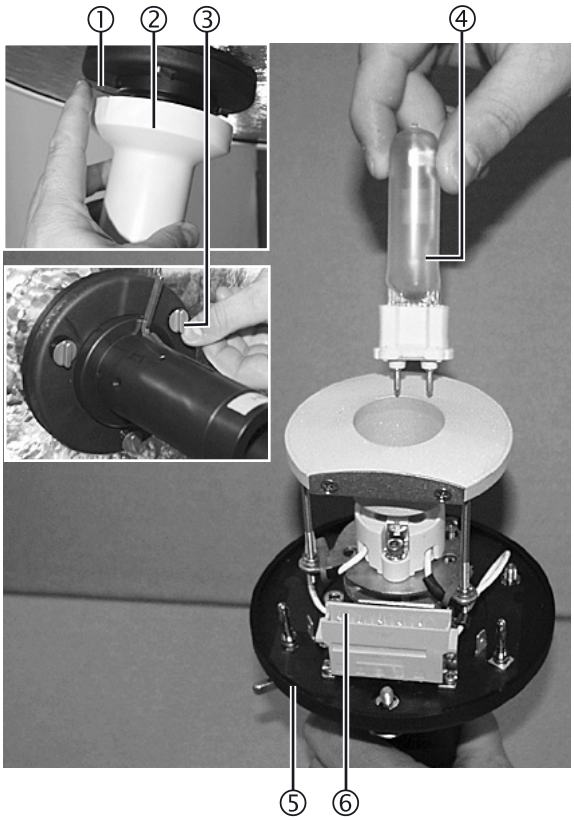
2. Undo the three screws ③ and remove the focus unit ④.
3. Unscrew the two cross-recessed head screws ⑤ and remove the old lamp ⑥ together with the base ⑦ by pulling it upwards and dispose of it in an appropriate manner.

Installation:

4. Fit the new lamp ⑥ together with the base ⑦ holding it by the packaging film/using a soft cloth and fit the components as described above, but in the reverse order.
5. Insert the focus unit ④ into the lamp so that both the plug connectors ⑨ are aligned.
6. Tighten the three screws ③ by hand.
7. Attach the central hand grip ②.

5 Changing the Lamp

Figure 03



5.3 Changing the lamp of the XENION M/ M+

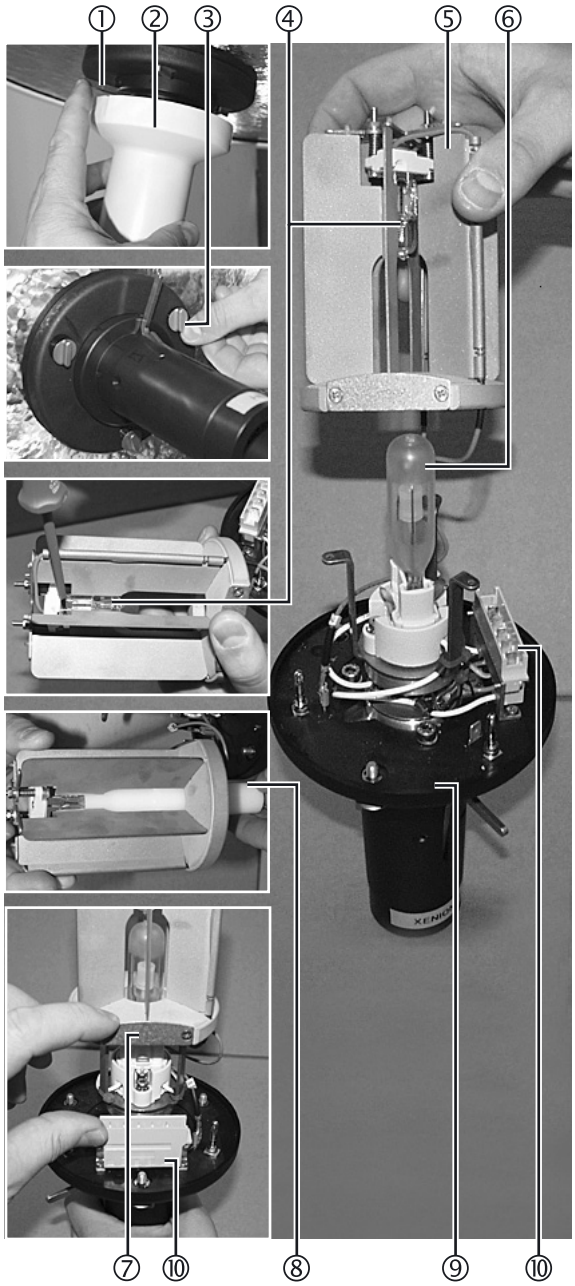
Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Undo the three screws ③ and remove the focus unit ⑤.
3. Remove the old metal vapour lamp ④ by pulling it upwards and dispose of it in an appropriate manner.

Installation:

4. Fit the new metal vapour lamp ④ holding it by the packaging film/using a soft cloth and assemble the components as described above, but in the reverse order.
5. Insert the focus unit ⑤ into the lamp so that both the plug connectors ⑥ are aligned.
6. Tighten the three screws ③ by hand.
7. Attach the central hand grip ②.

Figure 04



5.4 Changing the lamp of the XENION L/ L+

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Undo the three screws ③ and remove the focus unit ⑨.
3. Turn the aperture attachment ⑤ 45 degrees to the left (anti-clockwise) and remove by pulling upwards.

WARNING – Failure of the spare lamp:

- Always change both lamps (supplied as a set).

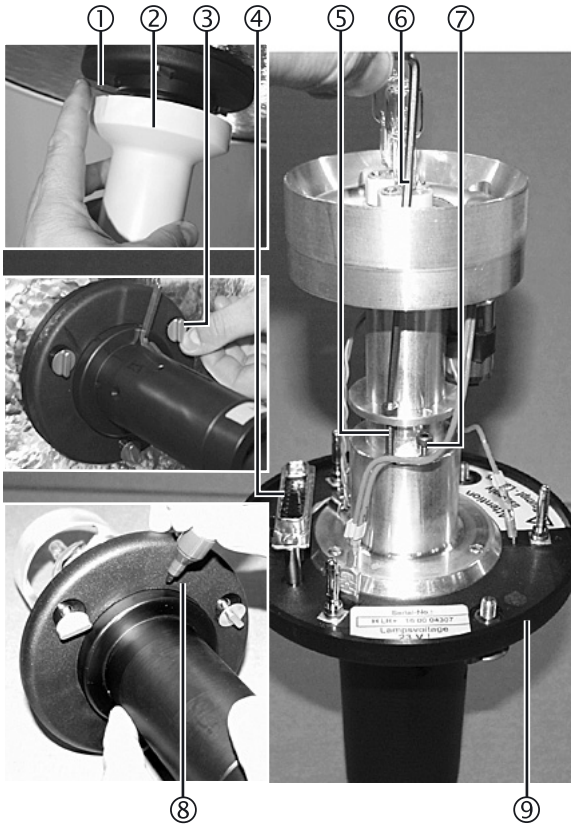
4. Using a screwdriver, push out the old halogen lamp ④, remove it from the aperture attachment ⑤ and dispose of it in an appropriate manner.
5. Remove the old metal vapour lamp ⑥ by pulling it upwards and dispose of it in an appropriate manner.

Installation:

6. Insert the halogen lamp ④ together with the accompanying plastic mount ⑧ into the aperture attachment ⑤.
7. Insert new metal vapour lamp ⑥ holding it by the packaging film/using a soft cloth.
8. Insert the aperture attachment ⑤ so that the surface ⑦ and the connector ⑩ are aligned.
9. Assemble the components as described above, but in the reverse order.
10. Insert the focus unit ⑨ so that both the plug connectors ⑩ are aligned.
11. Attach the central hand grip ②.

6 Setting the Luminous Field

Figure 01



6.1 Setting the luminous field for the HELION M/M+ / L/L+

Setting is described using the HELION L as an example.

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Undo the three screws ③ and remove the focus unit ⑨.
3. Using an Allen key size 25 ⑥:

- unscrew the long cheese head screw ⑤ a short way,
- screw the short cheese head screw ⑦ in a short way.

Installation:

4. Fit the components as described above, but in the reverse order.

WARNING – Electric Shock:
The following adjustments must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

5. Switch on the power supply and the lamp.
6. Mark the maximum and minimum luminous field diameters on the hand grip according to the lamp specification ⑧.

Removal:

7. Switch on the power supply and the lamp.
8. Undo the three screws ③ and remove the focus unit ⑨.
9. With an Allen key size 2.5 ⑥ adjust the long cheese head screw ⑤ and the short cheese head screw ⑦ according to the markings.

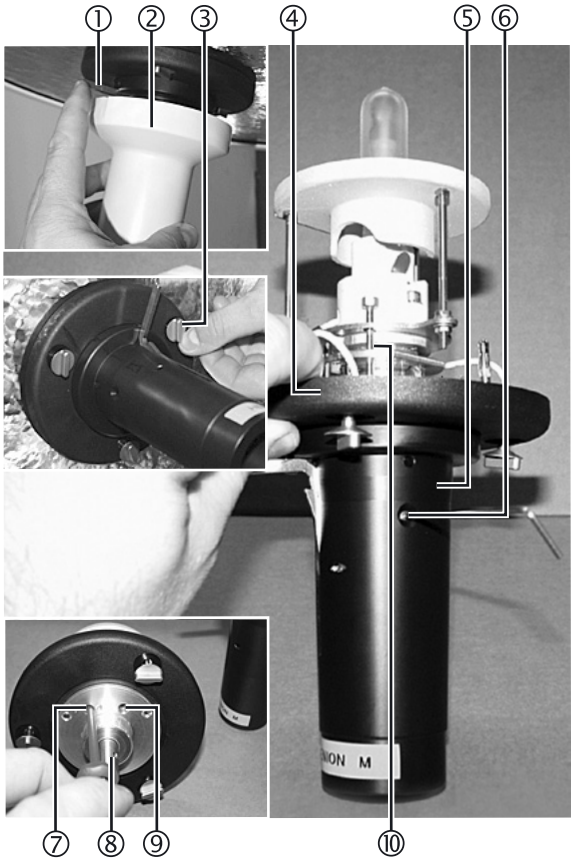
Installation:

10. Fit the components as described above, but in reverse order.

Functional test:

11. Carry out functional test.
12. Repeat procedure if necessary.
13. Fix the long cheese head screw ⑤ and the short cheese head screw ⑦ with screw-locking varnish.

Figure 02



6.2 Setting the luminous field for the XENION M/M+

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Unscrew the set screw ⑥ and remove the focus hand grip ⑤.
3. Using a screwdriver for cross-recessed head screws:

- unscrew the recessed head screw ⑦ a short way,
- screw the cross-recessed head screw ⑨ in a short way.

Setting:

WARNING – Electric Shock:
The following test must be carried out with the power supply switched on.
Cordon off installation site and proceed with great care.

4. Switch on the power supply and the lamp.
5. Set the maximum and minimum luminous field diameters according to the lamp specification (see Technical Data), and pull the pivot ⑧ outwards while turning it.
6. Attach the focus hand grip ⑥ and tighten the set screw ⑤.

Functional test:

7. Carry out functional test.
8. Repeat procedure if necessary.

Removal:

9. Switch on the power supply and the lamp.
10. Undo the three screws ③ and remove the focus unit ④.
11. Fix set screws ⑦/⑨ in each of the threads of the adjusting plate ⑩ with screw-locking varnish.

Installation:

12. Fit the components as described above, but in reverse order.

Functional test:

13. Carry out functional test.

Figure 03

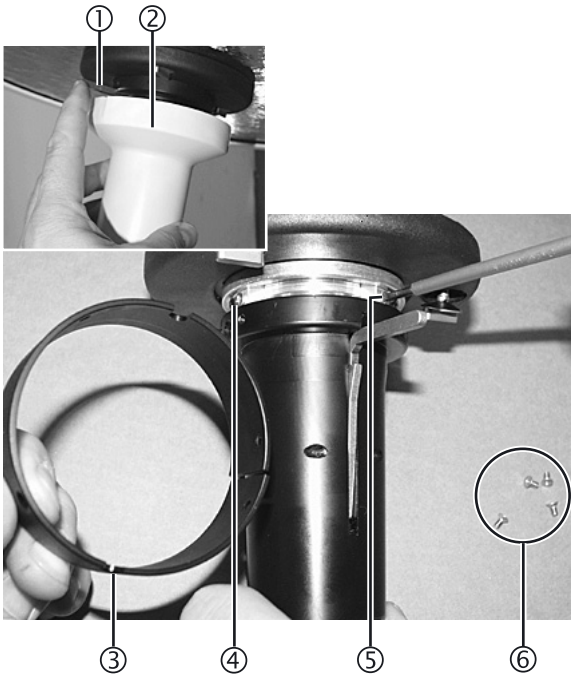


Figure 04

6.3 Setting the luminous field for the XENION L/L+

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Unscrew the four cross-recessed head screws ⑥ and remove the trim ring ③.
3. Set the maximum and minimum luminous field diameters on the two cross-recessed head screws according to the lamp specification ④/⑤.

Functional test:

4. Carry out functional test.
5. Repeat procedure if necessary.
6. Fix the cross-recessed head screws ④/⑤ with screw-locking varnish.

Installation:

7. Fit the components as described above, but in reverse order.

6.4 Setting the luminous field for the XENION M with fixed focus camera

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Unscrew the cross-recessed head screw ③.
3. Set the maximum and minimum luminous field diameters according to the lamp specification by adjusting the ribbed surface ④.
4. Tighten the cross-recessed head screw ③.

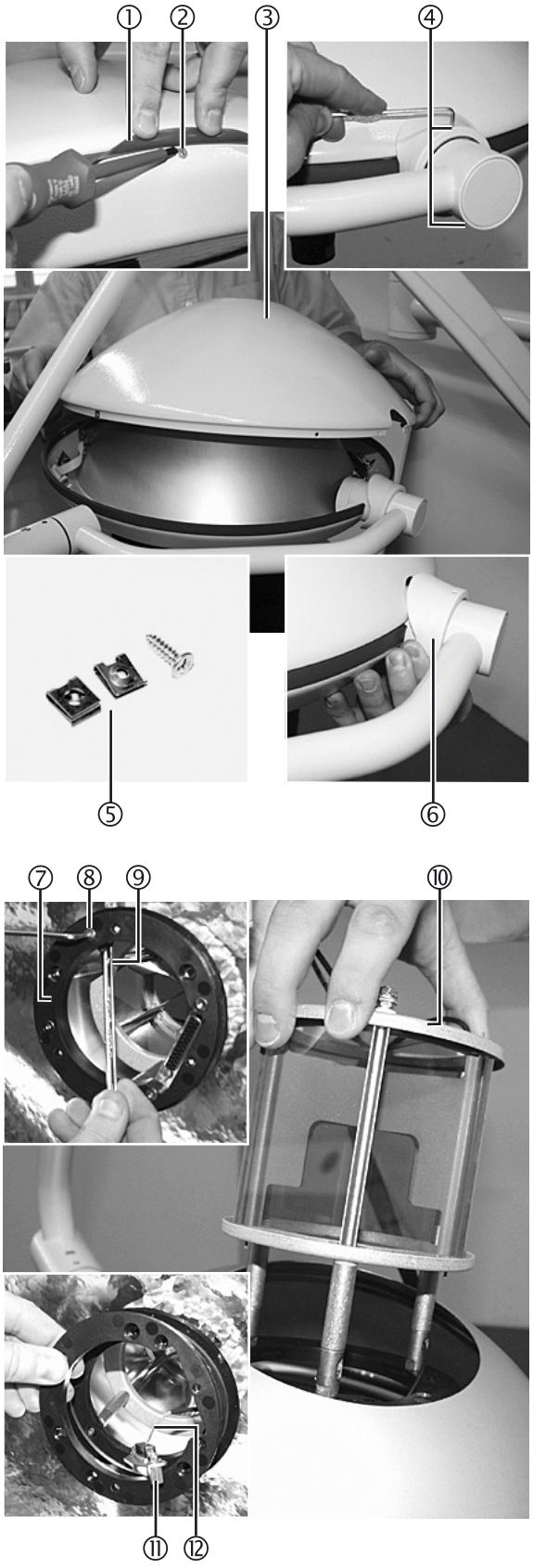
Functional test:

5. Carry out functional test.
6. Repeat procedure if necessary.
7. Fix the cross-recessed head screw ③ with screw-locking varnish.

Installation:

8. Fit the components as described above, but in reverse order.

Figure 01



Dismantling the lamp cover:

1. Lift the sealing lip ①, unscrew the sheet-metal screws ② and put the sheet-metal clips ⑤ in a safe place.
2. Unscrew the two set screws ④ and push back the plastic cover ⑥ from the lamp.
3. Remove the lamp cover ③.

Dismantling the filter glass assembly:

CAUTION – Damage to reflector:

- Do not touch the reflector on the inside of the lamp,
- When unscrewing the four countersunk Allen screws ⑧ hold on to the SUB-D connector (HEL)/high-voltage contact plug (XEN) ⑪.

4. Hold the internal hexagon nut ⑨ securely with a fork wrench and unscrew the four countersunk Allen screws ⑧.
5. Remove the plastic ring ⑦.
6. Lift the filter glass assembly ⑩ and SUB-D connector (HEL)/high-voltage contact plug (XEN) ⑪ carefully up and out of the lamp.
7. Disconnect the connecting lines ⑫ from the electronics.

Installing the filter glass assembly:

8. Fit the new filter glass assembly (the connecting lines are also supplied) as described above, but in reverse order.

Functional test:

WARNING – Electric Shock:
The following test must be carried out with the power supply switched on.
Cordon off installation site and proceed with great care.

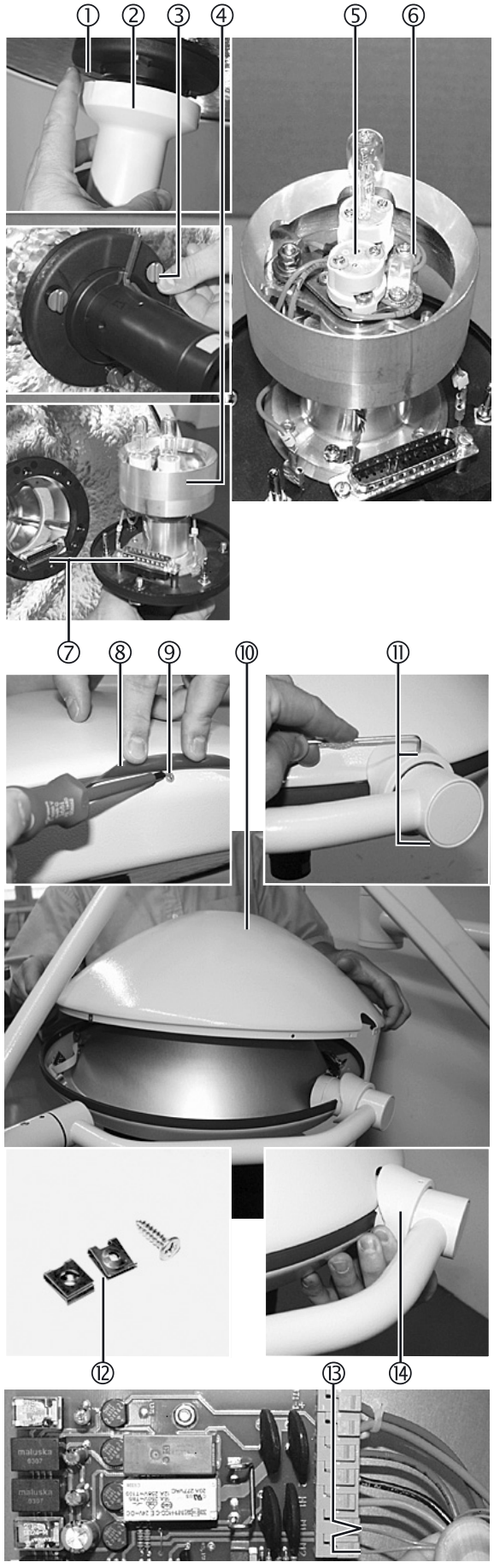
9. Switch on the power supply and the lamp.
10. Carry out functional test.

Installing the lamp cover:

11. Insert the sheet-metal clips ⑤ into the lamp cover ③ and install the lamp cover ③ as described above, but in reverse order.
12. Check the secure positioning of the lamp cover ③.

8 Testing the Servomotor for the HELION M/M+ / L/L+

Figure 01



8.1 Testing the polarity of the servomotor

Dismantling the focus unit:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Undo the three screws ③ and remove the focus unit ④.
3. Remove the central lamp ⑤ using a soft cloth.

Fitting the focus unit:

4. Insert the focus unit ④ into the lamp so that both the plug connectors ⑦ are aligned.
5. Switch on the power supply and the lamp.

Functional test:

6. Remove the focus unit ④ from the lamp again. If the remaining lamp ⑤ is not in the centre:

- check if the position of the cables ⑥ is preventing the lamp ⑤ from swivelling,
- change the polarity of the servomotor.

Changing the polarity:

7. Lift the sealing lip ⑧, unscrew the sheet-metal screws ⑨ and put the sheet-metal clips ⑫ in a safe place.
8. Unscrew the two screws ⑪ and push back the plastic cover ⑭ from the lamp.
9. Remove the lamp cover ⑩.
10. Change the cables of the servomotor ⑬ on the PCB.

Functional test:

WARNING – Electric Shock:
The following test must be carried out with the power supply switched on.
Cordon off installation site and proceed with great care.

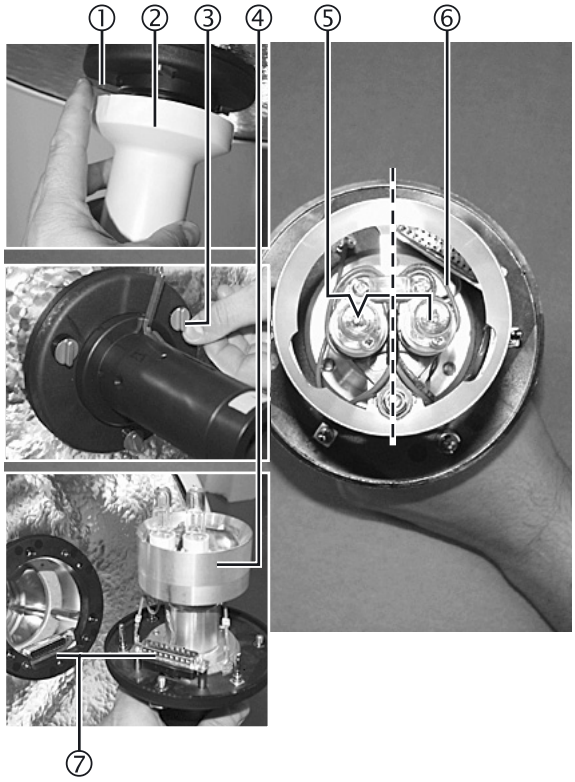
11. Switch on the power supply and the lamp.
12. Carry out functional test. If the remaining lamp ⑤ is not in the centre:

- test the servomotor according to Chapter 8.2:

Installing the lamp cover:

13. Insert the sheet-metal clips ⑫ into the lamp cover ⑩ and fit the lamp cover ⑩ as described above, but in reverse order.
14. Check the secure positioning of the lamp cover ⑩

Figure 02



8.2 Testing the servomotor

Dismantling the focus unit:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Undo the three screws ③ and remove the focus unit ④.
3. Swivel the two lamps ⑤ onto the middle axis represented by the dashed line.

Fitting the focus unit:

4. Insert the focus unit ④ into the lamp so that both the plug connectors ⑦ are aligned, then activate the lamp.

Functional test:

5. Remove the focus unit ④ from the lamp again.
   If the two lamps ⑤ are still on the middle axis represented by the dashed line:

- check if the position of the cables ⑥ is preventing the lamps ⑤ from swivelling,
- Test the connection of the servomotor to the electronics.

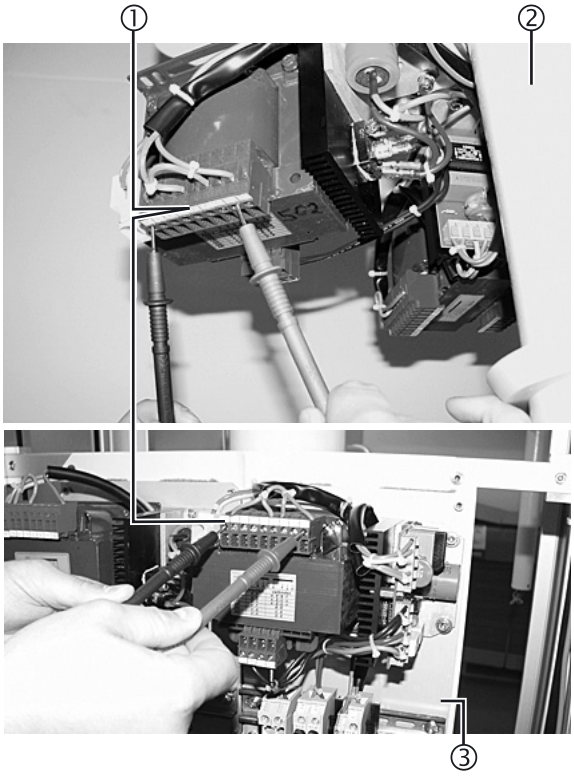
Replacing the focus unit (servomotor):

6. If the two lamps ⑤ are still on the middle axis represented by the dashed line:

- the servomotor is defective.
- Replace the entire focus unit ④.

9 Testing the Input Voltages

Figure 01



9.1 Testing the input voltage of the transformer

The input voltage is measured at the transformer terminal ①. Depending on the installation location, the transformer is installed on the ceiling tube ②, in the control cabinet or on a mounting plate ③.

Testing the input voltage:

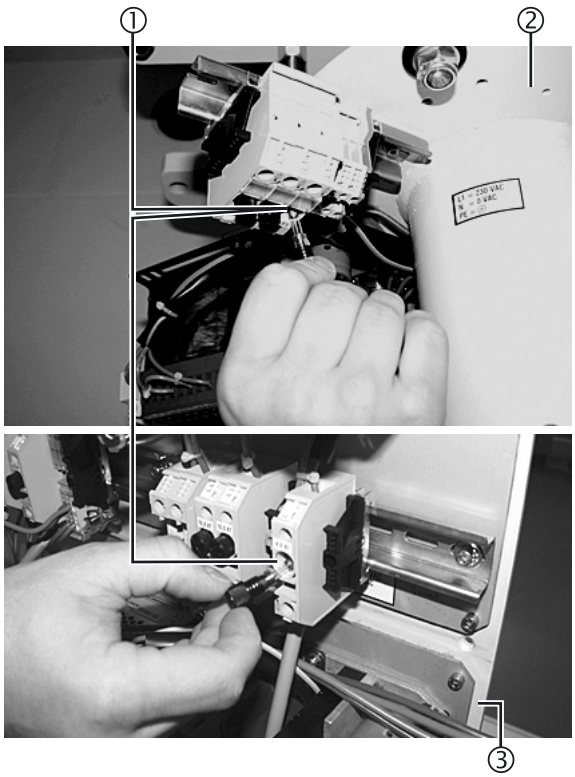
1. Remove covers etc, open the control cabinet.

WARNING – Electric Shock:
The following test must be carried out with the power supply switched on.
Cordon off installation site and proceed with great care.

2. Switch on the power supply.
3. Using a voltmeter, measure the input voltage at the transformer terminal ①:

- If there is no input voltage, inform the customer's technicians.

Figure 02



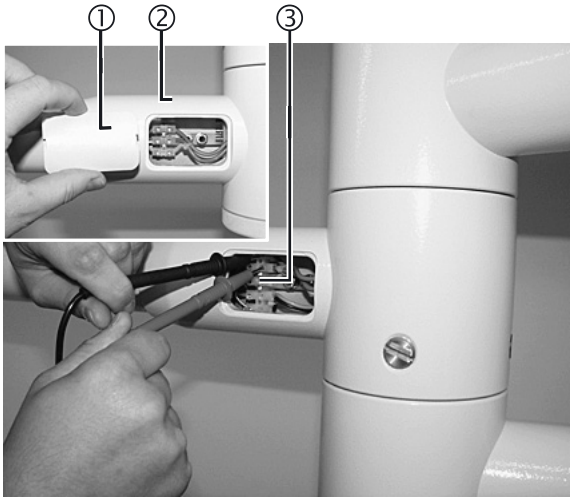
9.2 Testing the mains fuse for the building power supply

The mains fuse is tested at the fuse terminal ①. Depending on the installation location, the fuse terminal ① is installed on the ceiling tube ②, in the control cabinet or on a mounting plate ③.

Testing the mains fuse:

1. Switch off the power supply.
2. Remove covers etc, open the control cabinet.
3. Remove the mains fuse at the fuse terminal ①, test it and replace if necessary.

Figure 01



10.1 Testing the voltage at the sliding contact in the extension arm

The input voltage is measured at the contact block ③ in the extension arm ②.

1. Remove the cover ① from the extension arm ②.

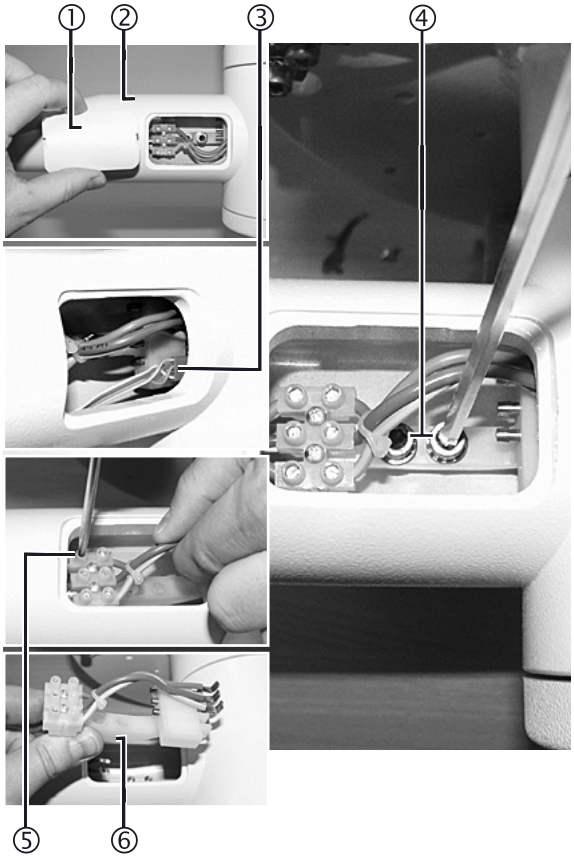
Testing the input voltage at the contact block:

WARNING – Electric Shock:
The following adjustments must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

2. Switch on the power supply and the lamp.
3. Using a voltmeter, measure the input voltage at the contact block ③:

- check the proper positioning of the cables,
- if there is still no input voltage, the sliding contact in the extension arm ② must be tested according to Section 10.2 and replaced if necessary.

Figure 02



10.2 Replacing the sliding contact in the extension arm/testing the slip ring on the central column

Removal:

1. Remove the cover ① from the extension arm ②.

NOTE – in the case of 7-pole sliding contacts:
Disconnect the low-voltage plug connection ③.

2. Unscrew the two socket head cap screws size 5 ④ and put them in a safe place.
3. Disconnect the cables at the terminal block ⑤ and remove the sliding contact ⑥.

Testing the slip ring on the central column:

4. Before fitting a new sliding contact ⑥ check that the slip ring on the central column is functioning properly:
5. Carry out a contact resistance test between the terminal block on the transformer and the slip ring in the extension arm:

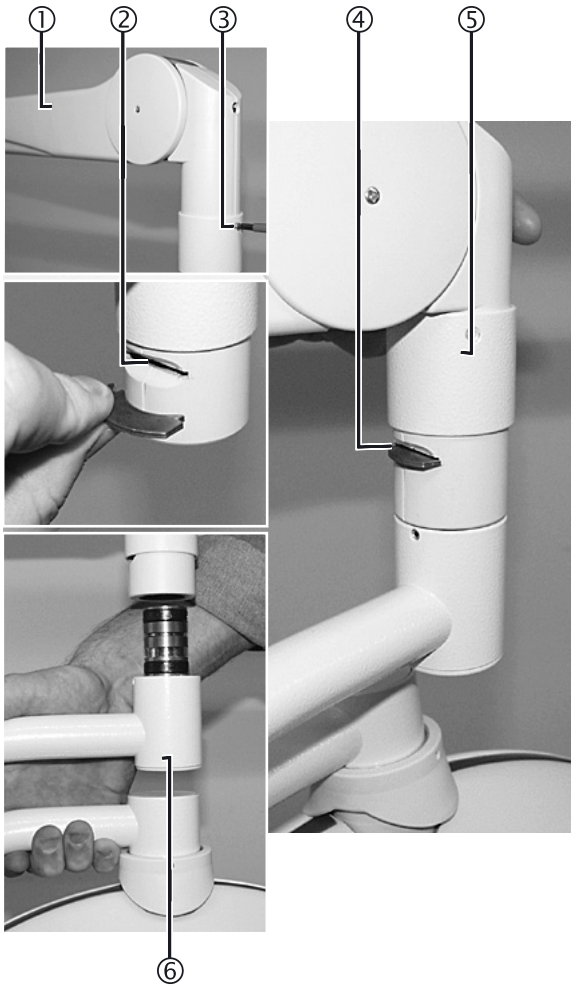
• If the resistance is infinite, the slip ring must be replaced in accordance with the following sections:

- 10.3 Dismantling the light head,
- 10.5 Dismantling the spring arm,
- 10.8 Dismantling the central column,
- 10.9 Changing the slip ring.

Installation:

5. Fit the new sliding contact ⑥ as described above, but in reverse order.
6. Fit the cover ①.

Figure 03



10.3 Dismantling the light head

WARNING - Sudden release of spring arm:

- The spring arm ① is under high tension. If the lamp ⑥ is not removed in the uppermost spring arm position, the spring arm ① releases suddenly, springing upwards, and can cause serious injury.
- Only dismantle the lamps ⑥ when the spring arm ① is in the uppermost position.

1. Place the spring arm ① (in the example: Acrobat 2000) in the uppermost position.
2. Unscrew the cross-recessed head screw ③ and push the sleeve ⑤ up.
3. Using a small screwdriver, remove the locking segment ④ from the slot ② and put it in a safe place.
4. Remove the light head ⑥ with cardanic suspension from the spring arm ① and carefully put it aside.

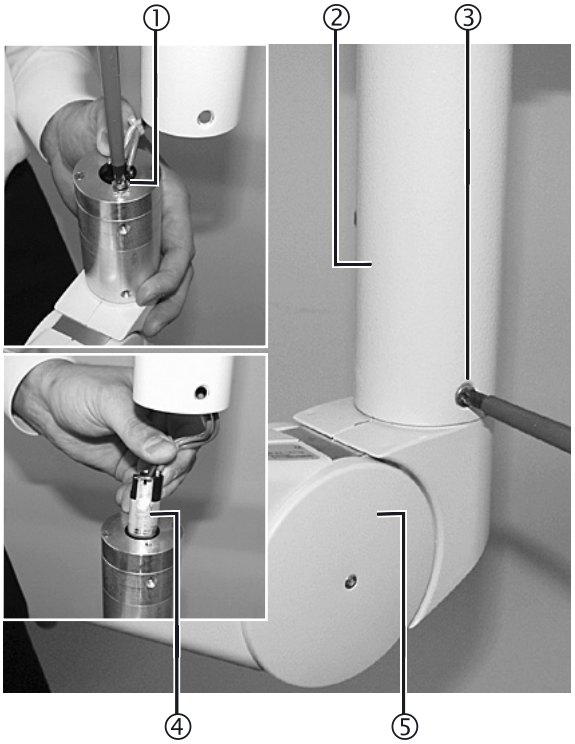
10.4 Testing the cables in the spring arm that lead to the contact block in the extension arm

1. Carry out an all-pole contact resistance test between the spring arm (sliding coupling) and the contact block in the extension arm:

- If the resistance is infinite, the spring arm must be replaced in accordance with Section 10.5.
- If the resistance is almost zero, the cables in the light head and the cardanic suspension must be tested:

- Carry out a contact resistance test between the input terminal of the electronics and the sliding connector on the cardanic suspension (replace entire cabled cardanic suspension if necessary).

Figure 04



10.5 Dismantling the spring arm

1. Unscrew the four recessed countersunk head screws M5 x 8 mm ③.
2. Carefully remove the spring arm ⑤ from the extension tube ②.

Only if there are additional cables in the spring arm:

3. Remove the lateral covering on the spring arm.
4. Undo the cable fixtures and carefully remove the cables from the spring arm.

5. Unscrew the two cross-recessed head screws ① and carefully remove the plug-in connector ④ from the spring arm ⑤.
6. Carefully put the spring arm ⑤ aside.

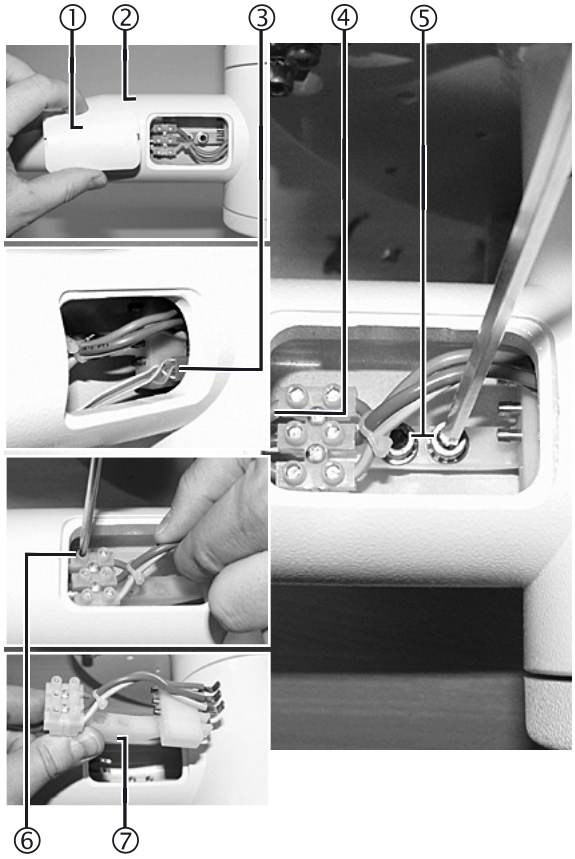
10.6 Testing the cables in the extension arm

1. Carry out an all-pole contact resistance test between the extension arm (sliding connector) and the contact block in the extension arm:

- If the resistance is infinite, the cables in the extension arm must be replaced in accordance with Section 10.7.
- If the resistance is almost zero, the cables in the spring arm must be tested:

- Carry out an all-pole contact resistance test between the two sliding couplings of the spring arm (replace the entire cabled spring arm if necessary).

Figure 05



10.7 Replacing the cables in the extension arm

After the lamp and the spring arm have been dismantled, the cables in the extension arm can be replaced.

Removal:

1. Remove the cover ① from the extension arm ②.

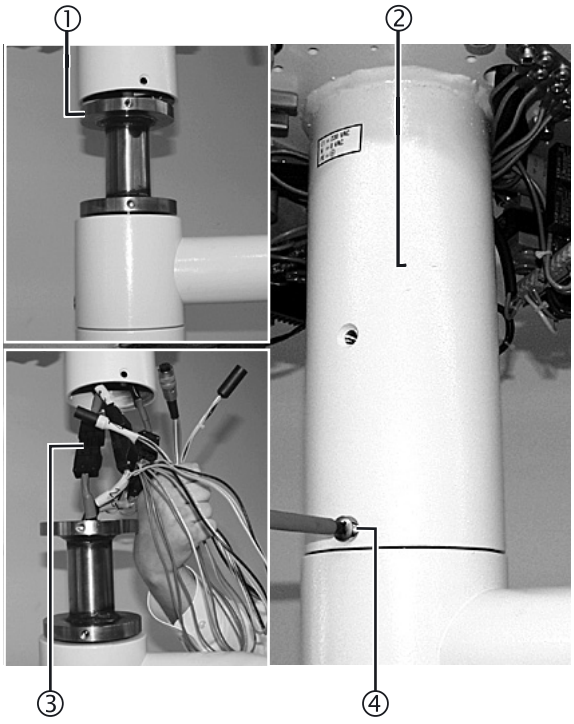
NOTE – in the case of 7-pole sliding contacts:
Disconnect the low-voltage plug connection ③.

2. Unscrew the two socket head cap screws size 5 ⑤ and put them in a safe place.
3. Disconnect the cables at the terminal block ⑥ and remove the sliding contact ⑦.
4. Provide the cables ④ with a wire pull and pull them through the extension arm ②.

Installation:

5. Install the new cables ④ with pre-assembled sliding connector as described above, but in reverse order.
6. Fit the spring arm and the lamp in accordance with the current assembly instructions.
7. Carry out functional test.

Figure 06

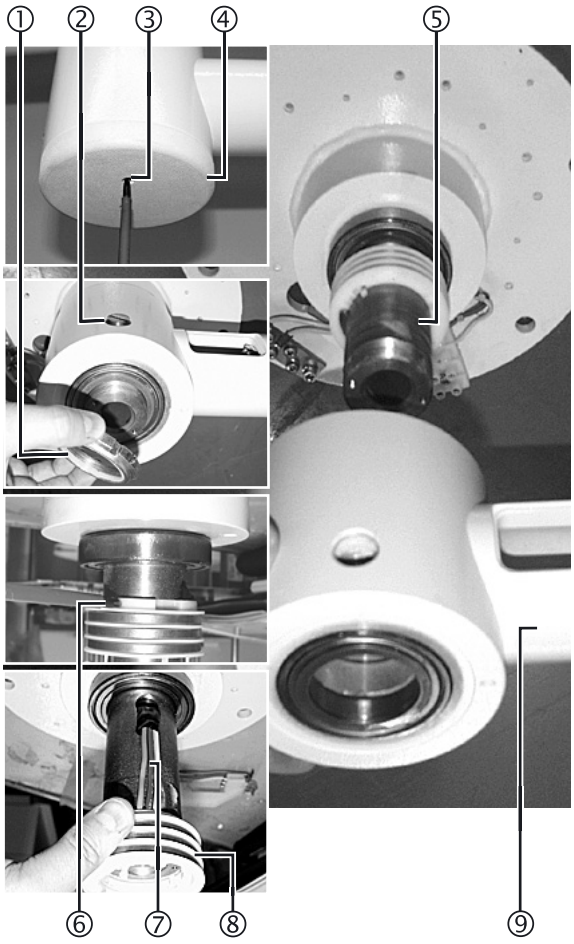


10.8 Dismantling the central column

WARNING – Heavy weight:
Two people are needed to dismantle a central column with 2 - 4 extension arms.

1. Unscrew the six recessed countersunk head screws M8 x 15 mm ④.
2. Carefully remove the central column ① from the ceiling tube ②.
3. Undo the plug connections ③ and carefully lay down the central column ①.

Figure 07



10.9 Replacing the slip ring

1. Unscrew the cross-recessed head screw ③ and remove the cover ④ of the central column ⑤.
2. Unscrew the two brake screws ②.
3. Dismantle the sliding contact in accordance with Section 10.2.
4. Undo the self-locking groove nut ① with a hook spanner and twist off from the central column ⑤.
5. Remove the extension arm ⑨ from the central column ⑤.
6. Disconnect all electrical cables of the slip ring ⑧ concerned.
7. Unscrew the cross-recessed head screw ⑥ on the slip ring ⑧.
8. Remove the slip ring ⑧ from the central column by feeding the electrical cables ⑦ into the central column ⑤.

Installation:

WARNING – Falling lighting system:
The self-locking groove nut ① must be replaced with a new one.

9. Fit the new slip ring ⑧ as described above, but in reverse order.
10. Fit the extension arm as described above, but in reverse order.

Functional check:

WARNING – Electric Shock:
The following adjustments must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

11. Switch on the power supply.
12. Testing the voltage at the contact block in the extension arm.

Installation:

13. Fit the spring arm and the lamp in accordance with the current assembly instructions.

Figure 01

11.1 Testing the voltage at the focus unit

The test is described using the HELION L as an example.

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Undo the three screws ③ and remove the focus unit ⑤.

Preparing for measurement:

3. Place three test prods ④ on the contacts of the focus unit ⑤.
4. Insert the focus unit ⑤.

Carrying out measurement.

WARNING – Electric Shock:
The following adjustments must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

5. Switch on the power supply and the lamp.
6. Measure the voltage with a voltmeter:

- The voltage must be 23 V +/- 0.3 V.
- In the case of voltage deviations, reset the voltage on the transformer in accordance with the specified values in the table.

7. Remove the three test prods ④.

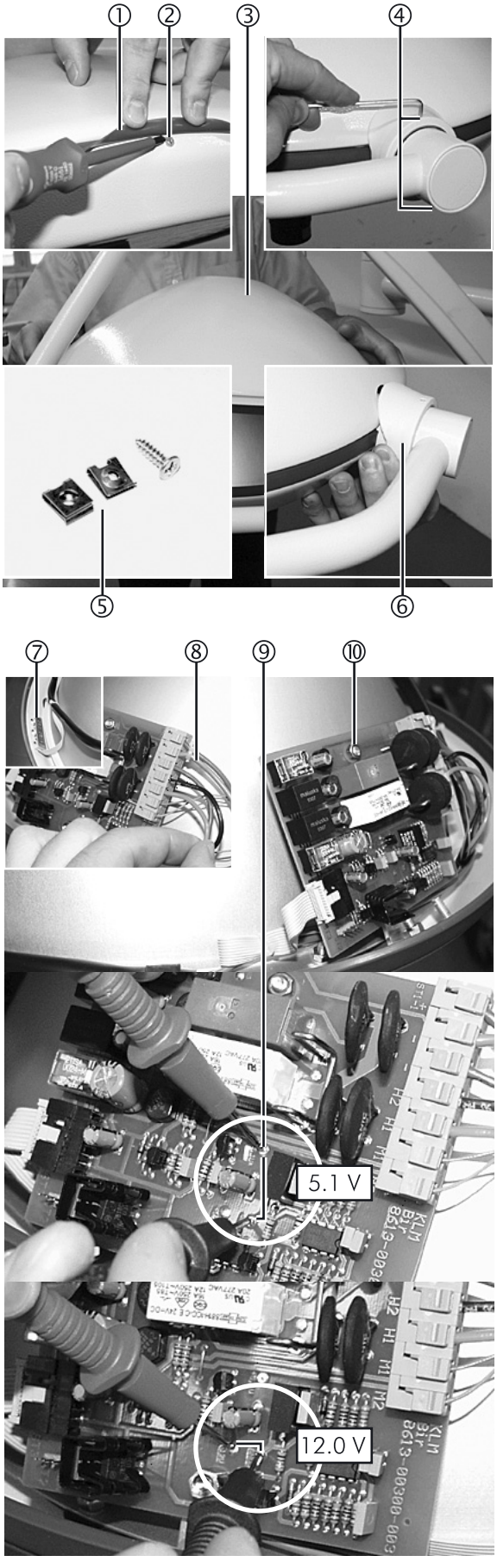
Installation:

8. Insert the focus unit ⑤ into the lamp so that both the plug connectors ⑥ are aligned, then activate the lamp.

Functional test:

9. Carry out functional test.

Figure 02



11.2 Testing the voltages and cables in the lamp

Dismantling the lamp cover:

1. Lift the sealing lip ①, unscrew the sheet-metal screws ② and put the sheet-metal clips ⑤ in a safe place.
2. Unscrew the two set screws ④ and push back the plastic cover ⑥ from the lamp.
3. Remove the lamp cover ③.

Check the cables on the PCB and control panel:

4. Check the secure positioning of the cables ⑦/⑧ on the PCB and the control panel.

Checking the voltages at the PCB:

WARNING – Electric Shock:
The following measurements must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

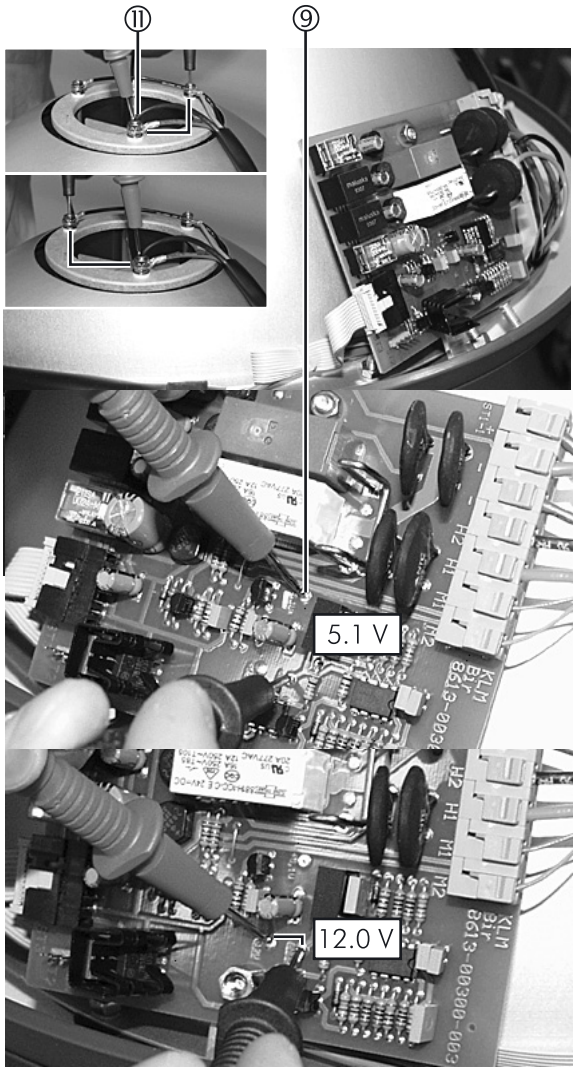
5. Switch on the power supply and the lamp.
6. Testing the input voltage on the electronics with a voltmeter.
7. Using a voltmeter, measure the voltage of:

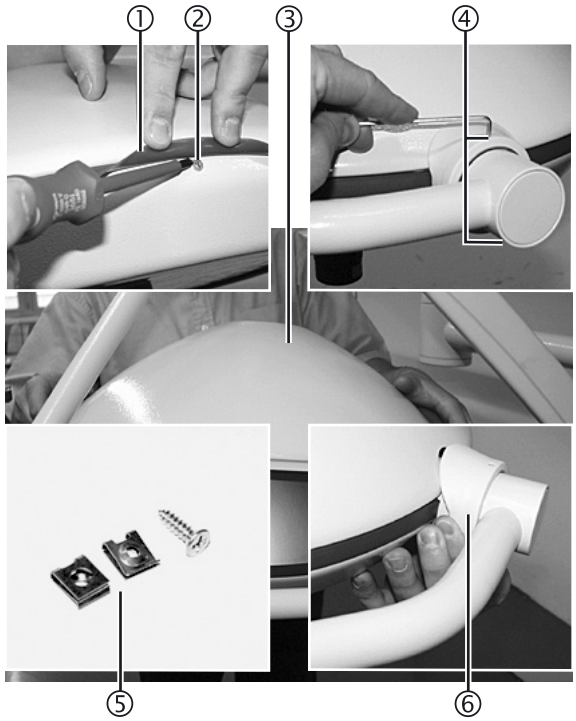
- 5.1 V DC (designated +5.1 V to GNDB) and
- 12 V DC (designated +12 V to GNDB) and measure at the measuring points ⑨ on the PCB:

• If there is no voltage to measure:
- test the cables according to Chapter 10:
• If the voltage is correct, change the PCB:
- remove all cable connectors from the PCB,
- take off the hexagon nut ⑩ and remove the PCB,
- fit the PCB as described above, but in reverse order, and attach the cable connector.

Continued on next page.

Figure 03





11.2 Testing the voltages and cables in the lamps (cont.)

WARNING – Electric Shock:
The following measurements must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

8. Switch on the power supply and the lamp and, if necessary, set the lamp to maximum brightness.

Measure the voltage at the contacts of the filter glass assembly:

9. Using a voltmeter, measure the voltage at the contacts ⑪:

• The voltage must be 23 V +/- 0.3 V.
- In the case of voltage deviations, set the voltage in accordance with Section 11.1.

If there is no voltage:

• Check the proper positioning of the cables:
• Check the cables for breaks:
- Replace defective cables/components and fit as described above, but in reverse order.

Installing the lamp cover:

10. Insert the sheet-metal clips ⑤ into the lamp cover ③ and fit the lamp cover ③ as described above, but in reverse order.
11. Check the secure positioning of the lamp cover ③.

12 Testing the Electrics of the HELION M+ / L+ Lamp

Figure 01

12.1 Testing the voltage at the focus unit

The test is described using the HELION L+ as an example.

Removal:

1. Unlock the central hand grip ② by means of the unlocking device ① and remove it.
2. Undo the three screws ③ and remove the focus unit ⑤.

Prepare for measurement:

3. Place three test prods ④ on the contacts of the focus unit ⑤.
4. Insert the focus unit ⑤.

Carry out measurement.

WARNING – Electric Shock:
The following adjustments must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

5. Switch on the power supply and the lamp.
6. Measure the voltage with a voltmeter:

- The voltage must be 23 V +/- 0.3 V.
- In the case of voltage deviations, reset the voltage on the transformer in accordance with the specified values in the table.

7. Remove the three test prods ④.

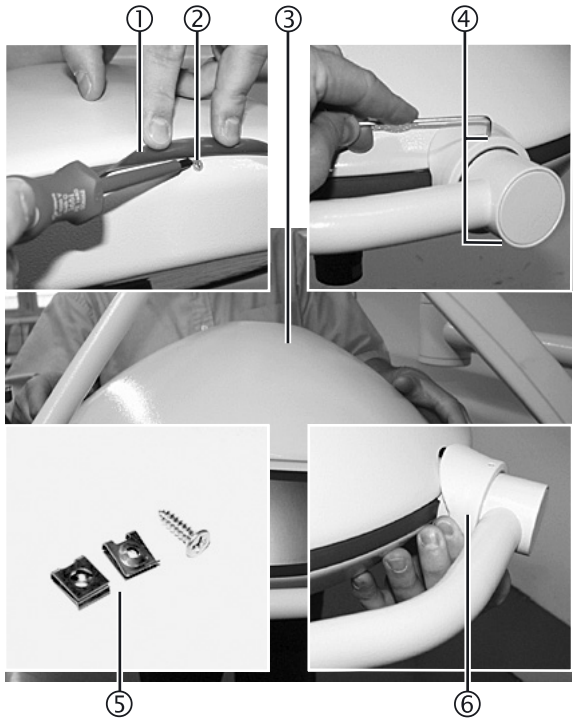
Installation:

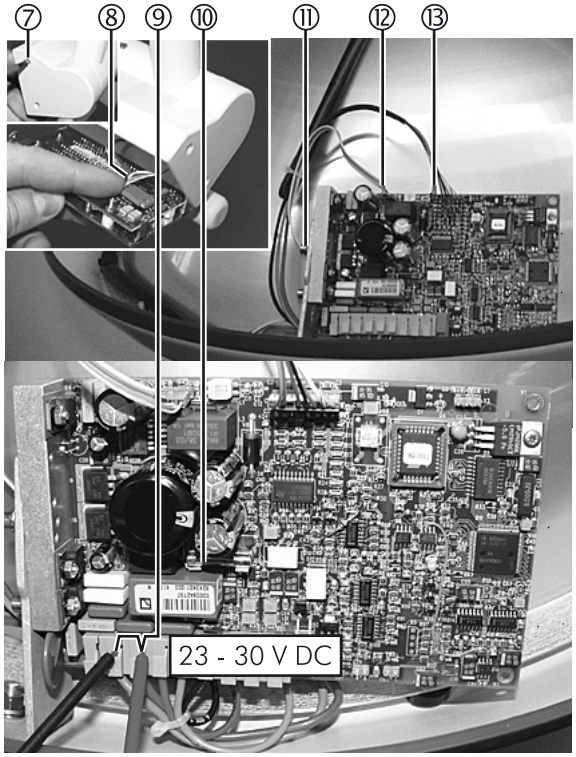
8. Insert the focus unit ⑤ into the lamp so that both the plug connectors ⑥ are aligned, then activate the lamp.

Functional test:

9. Carry out functional test.

Figure 02





12.2 Testing the operating voltages, fuse and cables in the lamp

The test is described using the HELION L+ as an example.

Dismantling the lamp cover:

1. Lift the sealing lip ①, unscrew the sheet-metal screws ② and put the sheet-metal clips ⑤ in a safe place.
2. Unscrew the two set screws ④ and push back the plastic cover ⑥ from the lamp.
3. Remove the lamp cover ③.

Check the cables on the PCB and control panel:

4. Unscrew the four recessed countersunk head screws ⑦ and remove the housing on the control panel.
5. Check the secure positioning of the cables ⑧/⑫/⑬ on the PCB and the control panel.

Checking the fuse and the voltage at the PCB:

6. Check the fuse ⑩ and replace if necessary.
   Fuse type: T1L 250 V (1 A slow-blow)

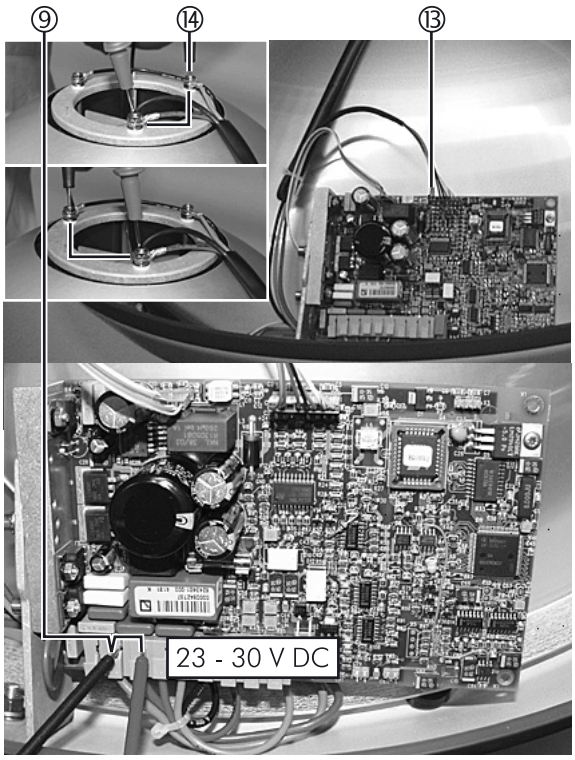
WARNING – Electric Shock:
The following measurements must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

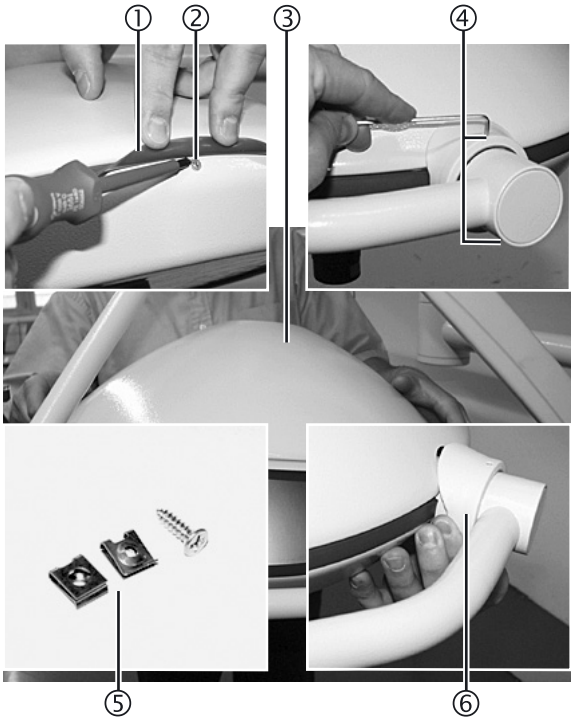
7. Switch on the power supply and the lamp and set the lamp to maximum brightness.
8. Using a voltmeter, measure the voltage at the terminal strip ⑨:

• The voltage must be between 23 V and 30 V DC.
- In the case of voltage deviations, reset the voltage on the transformer in accordance with the specified values in the table.
• If there is no voltage to measure:
- Test the cables according to Section 10.
• If the voltage is correct, change the PCB:
- remove all cable connectors from the PCB,
- unscrew the two Allen screws ⑪ and remove the PCB,
- fit the PCB as described above, but in reverse order, and attach the cable connector.

Continued on next page.

Figure 03





12.2 Testing the operating voltages, fuses and cables in the lamp (cont.)

WARNING – Electric Shock:
The following measurements must be made with the power supply switched on.
Cordon off installation site and proceed with great care.

9. Switch on the power supply and the lamp and, if necessary, set the lamp to maximum brightness.

Measure the voltage at the contacts of the filter glass assembly:

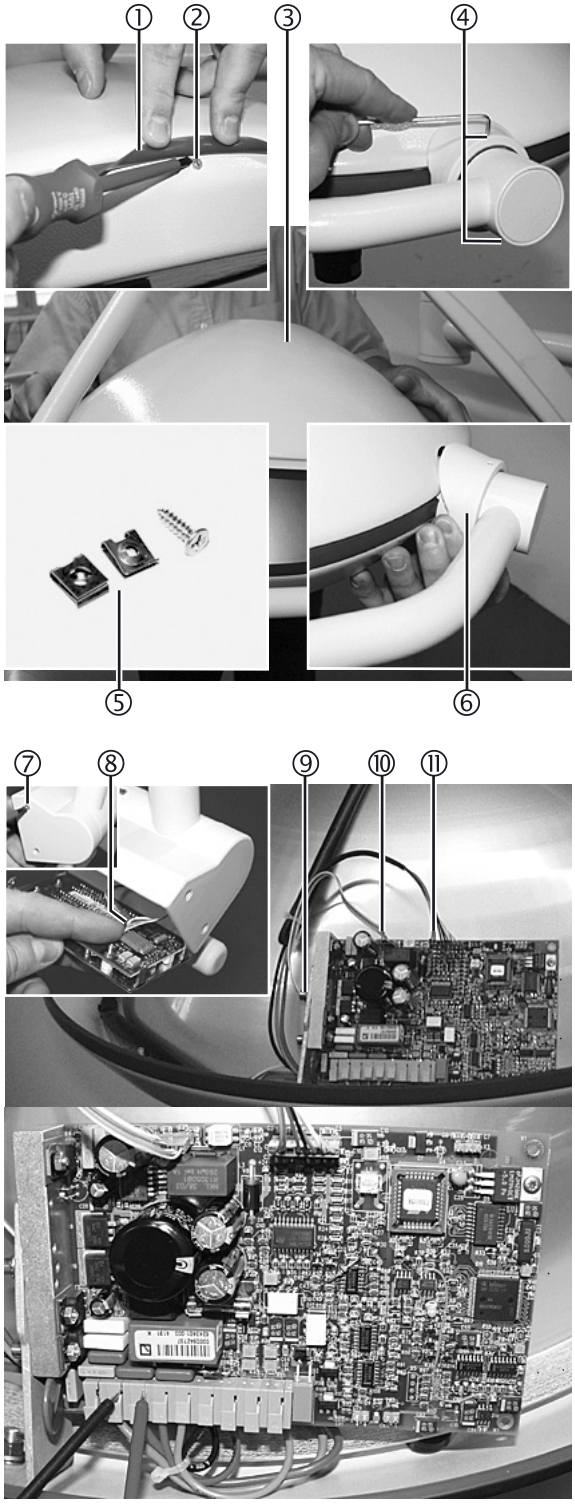
10. Using a voltmeter, measure the voltage at the contacts ⑭:

• The voltage must be 23 V +/- 0.3 V.
- In the case of voltage deviations, reset the voltage on the transformer in accordance with the specified values in the table.
• If there is no operating voltage:
- Check the proper positioning of the cables:
- Check the cables for breaks:
- Replace defective cables/components and assemble as described above, but in reverse order.

Installing the lamp cover:

11. Insert the sheet-metal clips ⑤ into the lamp cover ③ and fit the lamp cover ③ as described above, but in reverse order.
12. Check the secure positioning of the lamp cover ③.

Figure 04



12.3 If the dimmer is defective

Dismantling the lamp cover:

1. Lift the sealing lip ①, unscrew the sheet-metal screws ② and put the sheet-metal clips ⑤ in a safe place.
2. Unscrew the two set screws ④ and push back the plastic cover ⑥ from the lamp.
3. Remove the lamp cover ③.

Checking the cables from the PCB that lead to the control panel:

4. Unscrew the four recessed countersunk head screws ⑦ and remove the housing on the control panel.
5. Check the secure positioning of the cables ⑧/⑩/⑪on the PCB and the control panel.

Replacing the control panel:

6. Disconnect the cable connectors from the control panel.

Installation:

7. Fit the control panel as described above, but in reverse order.

Replacing the PCB:

8. Remove all cable connectors and cables from the PCB.
9. Unscrew the two Allen screws ⑨ and remove the PCB.

Installation:

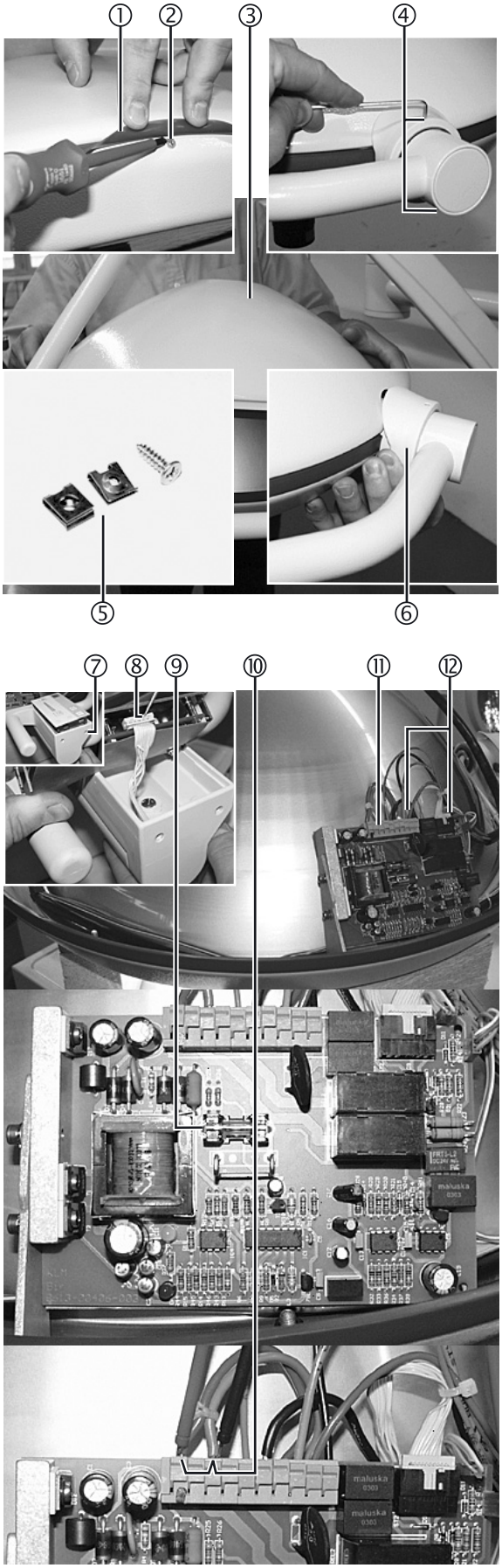
10. Fit the PCB as described above, but in reverse order.

Installing the lamp cover:

11. Insert the sheet-metal clips ⑤ into the lamp cover ③ and fit the lamp cover ③ as described above, but in reverse order.
12. Check the secure positioning of the lamp cover ③.

13 Testing the Electrics of the XENION M/M+ / L/L+ Lamp

Figure 01



13.1 Testing the operating voltages, fuses and cables in the lamp

Dismantling the lamp cover:

1. Lift the sealing lip ①, unscrew the sheet-metal screws ② and put the sheet-metal clips ⑤ in a safe place.
2. Unscrew the two set screws ④ and push back the plastic cover ⑥ from the lamp.
3. Remove the lamp cover ③.

Checking the cables on the PCB and control panel:

4. Unscrew the four recessed countersunk head screws ⑦ and remove the housing on the control panel.
5. Check the secure positioning of the cables ⑧/⑪/⑫on the PCB and the control panel.

Checking the voltage at the PCB and the fuses:

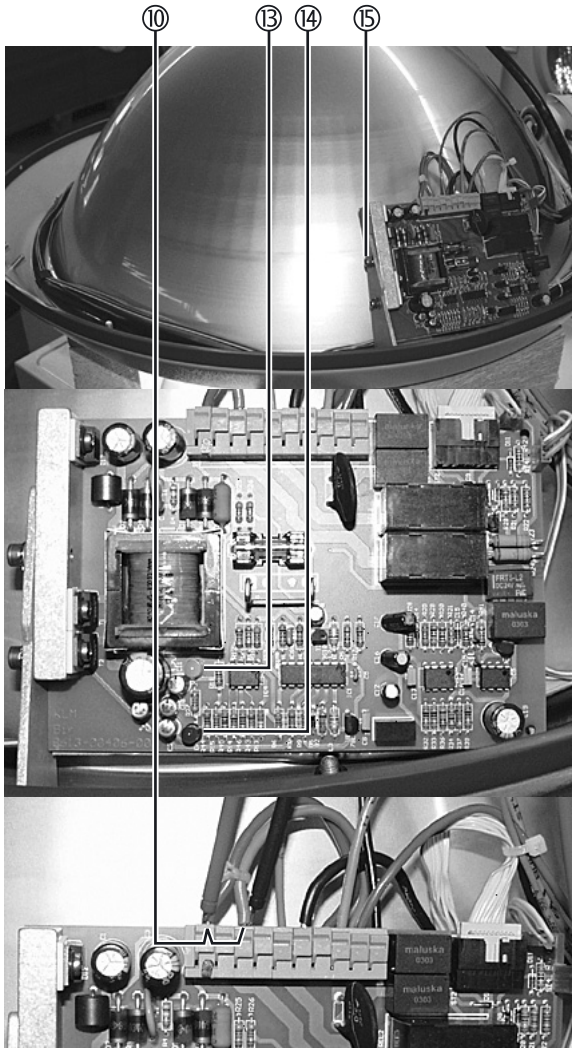
6. Check the fuses ⑨ and replace if necessary. Fuse type: T6L 250 V (6 A slow-blow)

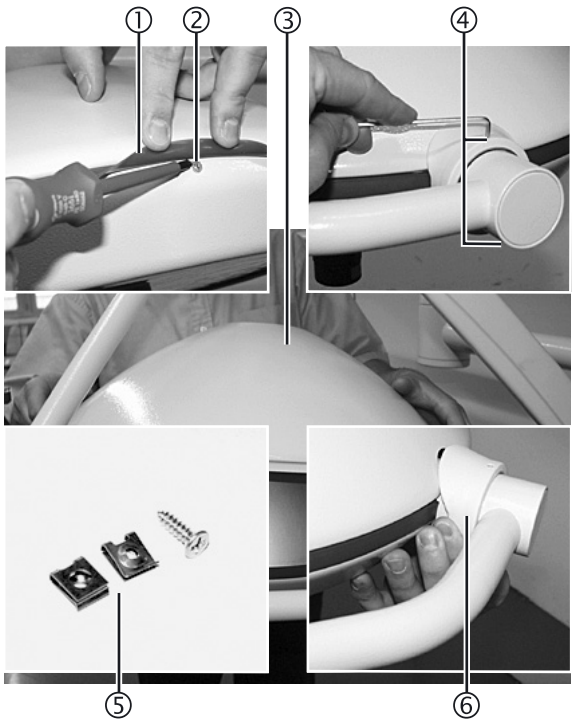
DANGER – Electric Shock – High Voltage:
The ballast in XENION lamps produces a starting voltage of 300 V:
When carrying out measurements in the lamp with the power switched on:
- cordon off the installation site,
- avoid all contact with conductive parts.

7. Switch on the power supply and the lamp and set the lamp to maximum brightness.

Continued on next page.

Figure 02





13.1 Testing the operating voltages, fuses and cables in the lamp (cont.)

Checking the voltage at the PCB and the transformer:

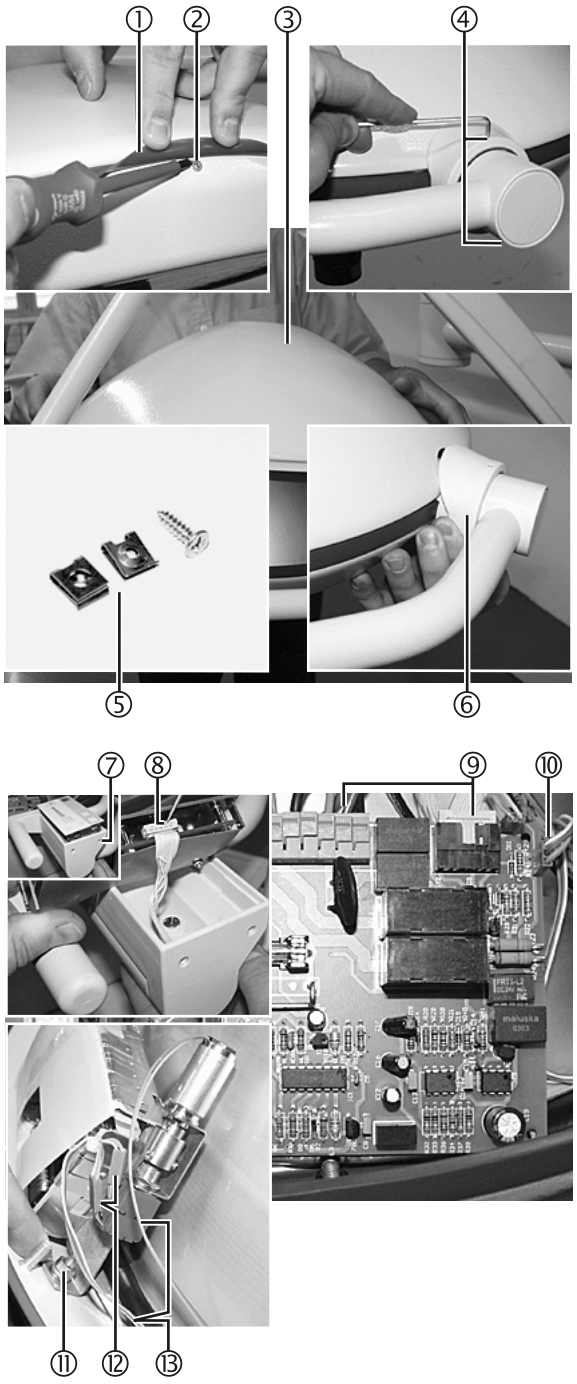
8. Using a voltmeter, measure the voltage at the contacts ⑩:

• The additional LED displays ⑬/⑭ mean:
- Green LED display ⑬ is lit up = undervoltage
- Red LED display ⑭ is lit up = overvoltage
• The voltage must be 24 V +/-0.5 V.
- In the case of voltage deviations, reset the voltage on the transformer in accordance with the specified values in the table.
• If there is no voltage to measure:
- Test the cables according to Section 10.
• If the voltage is correct, change the PCB:
- remove all cable connectors from the PCB,
- unscrew the two Allen screws ⑮ and remove the PCB,
- fit the PCB as described above, but in reverse order and attach the cable connectors.

Installing the lamp cover:

9. Insert the sheet-metal clips ⑤ into the lamp cover ③ and fit the lamp cover ③ as described above, but in reverse order.
10. Check the secure positioning of the lamp cover ③.

Figure 03



13.2 If the dimmer is defective

Dismantling the lamp cover:

1. Lift the sealing lip ①, unscrew the sheet-metal screws ② and put the sheet-metal clips ⑤ in a safe place.
2. Unscrew the two set screws ④ and push back the plastic cover ⑥ from the lamp.
3. Remove the lamp cover ③.

Checking the cables from the PCB that lead to the control panel:

4. Unscrew the four recessed countersunk head screws ⑦ and remove the housing on the control panel.
5. Check the secure positioning of the cables ⑧/⑨ on the PCB and the control panel.

Checking the cables from the PCB that lead to the motor/potentiometer:

6. Check the secure positioning of the cables ⑩/⑬ and the plug ⑫ on the PCB and the ballast.

Replacing the ballast:

7. Remove all cable connectors from the motor/potentiometer.
8. Remove all cables from the ballast.
9. Take off the hexagon nut ⑪ and remove the ballast.

Installation:

10. Fit the ballast as described above, but in reverse order.

Installing the lamp cover:

11. Insert the sheet-metal clips ⑤ into the lamp cover ③ and fit the lamp cover ③ as described above, but in reverse order.
12. Check the secure positioning of the lamp cover ③.

14 Functional Check, Hand-Over and Customer Instruction

14.1 Important Information

WARNING - Malfunction:
Before the initial operation of the light system the electrical supply has to be checked and approved by qualified staff.

Hand-over to the customer

- A functional check has to be performed after servicing has been completed.

Check the earth connections

- Check that the earth connections comply with the current standards in your country.
- The lighting system must not be handed over to the customer until it has been tested. The hand-over must be documented in writing in accordance with the acceptance protocol in this service manual and verified by the customer.

Acceptance protocol according to the current standards

- The hand-over must comply with the standards DIN EN 60601-2-41 “Particular requirements for the safety of surgical luminaires and luminaires for diagnosis“ and VDE 0751-1 “Repeat tests/inspections of medical electrical devices or systems” and be documented in writing in accordance with the acceptance protocol and verified by the customer.

Demonstration on hand-over

- The equipment must be demonstrated to the customer on hand-over.

14.2 Inspection intervals and authorised staff

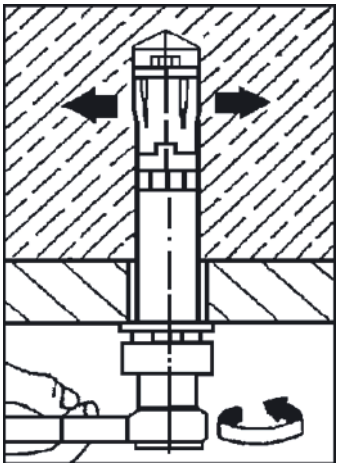
Inspection intervals

During and/or after all work on a surgical lamp and/or lamp combination, such as initial installation, repairs or maintenance, but at least every 12 months, a safety check is to be carried out by an authorised person! In addition, in the case of initial installation, the monitoring activities listed in this appendix must be carried out comprehensively and conscientiously, and recorded!
Following subsequent maintenance or repairs and/or every 12 months, these monitoring activities, in the form of safety checks or intensive maintenance, should be repeated and confirmed.

By authorised staff only

In the case of initial installation, the safety checks or monitoring activities must only be carried out by persons who, due to their training, knowledge and practical experience, are able to carry out such checks properly and are not under any other obligations as regards these monitoring activities!
This knowledge, capabilities and requirements are only met by staff of the TRUMPF Medizin Systeme GmbH Technical Customer Service or specially trained persons authorised by them!

Figure 01



14.3 Monitoring activities

Checking the wall/ceiling construction

Confirm the secure grip of all the heavy load anchors and fastening nuts on the ceiling anchor plate and, where applicable, on the intermediate plate.
When doing so observe the following points.

Checking the torques for heavy load anchors

- HELION S / M types (solo suspension):
  heavy load anchor HSL-M10/20,
  pull-out torque T_{inst} = 50 Nm,
  is used for round ceiling anchor plates.
- Types: HELION, XENION (multiple suspension):
  heavy load anchor HSL-M12/25,
  pull-out torque T_{inst} = 80 Nm,
  is used for square ceiling anchor plates.

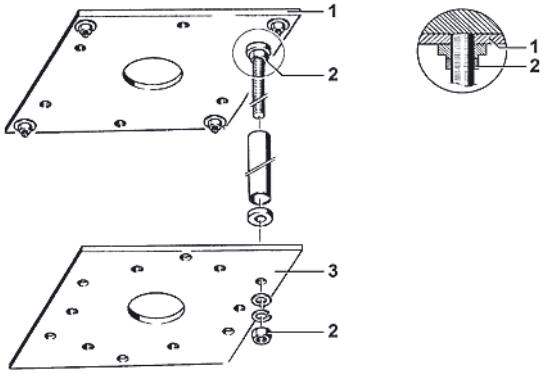
Checking the torques of heavy load anchors

If the given torque is not reached for one or more heavy load anchors, the ceiling anchor plate must be reattached using the appropriate measures (e.g. drilling the mounting holes, relocating the ceiling anchor plate)!

Check the torque of the intermediate ceiling construction

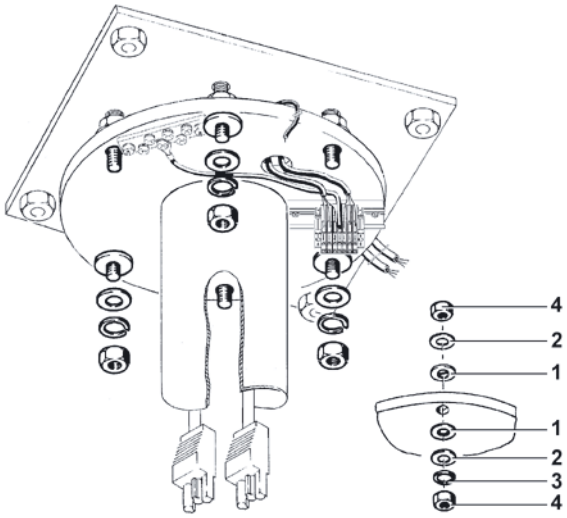
Check the secure grip of all the M 16 fastening nuts on the ceiling anchor plate and the intermediate plate with a torque wrench set to 170 Nm.

Figure 02



1 Ceiling anchor plate
2 M 16 fastening nuts
3 Intermediate plate

Figure 03



1 Insulation rings
2 Washers
3 Spring lock washer
4 M 12 nuts

Checking the ceiling tube bolt connection

- Checking the ceiling tube alignment:
- Check the correct (vertical) alignment of the ceiling tube using a spirit level.
- Checking the insulation rings, washers and spring lock washers:
- Check that all bolt connections on the ceiling tube have insulation rings (1), washers (2) and spring lock washers (3).
- Checking the ceiling tube bolt connection:
- Check the secure grip of the fastening bolts (4) on the ceiling tube bolt connection (torque: 45 Nm).
- Checking the electrical connections. Cables, connections and PCBs:
- Check the proper state and strength of the screw and clamp connections on the electrical components (mains supply, transformer, changeover PCB etc.) and the proper state of the electrical cables and PCBs.

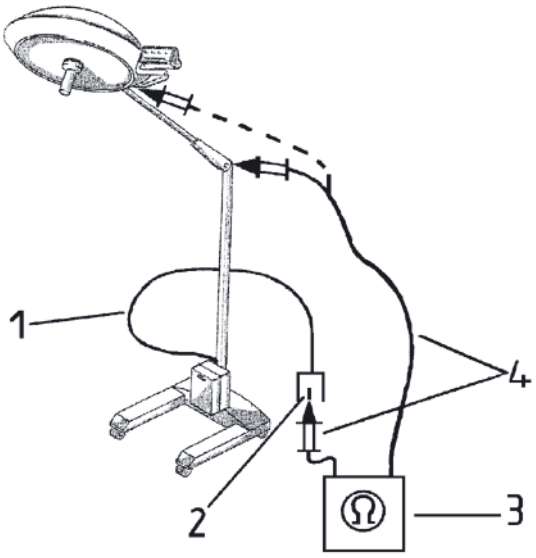
Checking the potential equalisation/earthed conductor resistance

A Mobile lamp

R_{imax} = 0.3 ohms

- Measure the resistance between the earthed conductor contact of the power line and all metal parts of the lamp.
- Enter the highest reading (max. 0.3 ohms) in the test report.

Figure 04



1 Power line
2 Earthing contact
3 Measuring instrument
4 Instrument leads

Figure 05

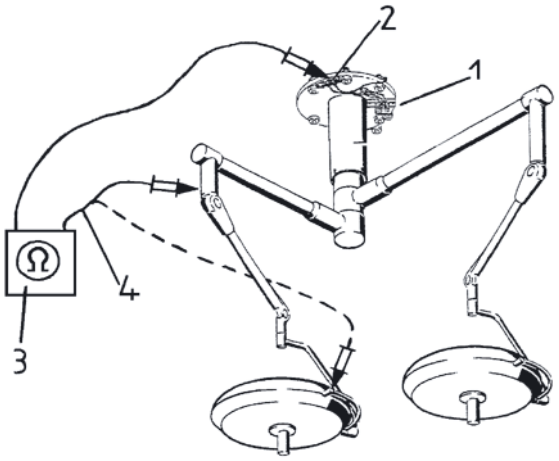
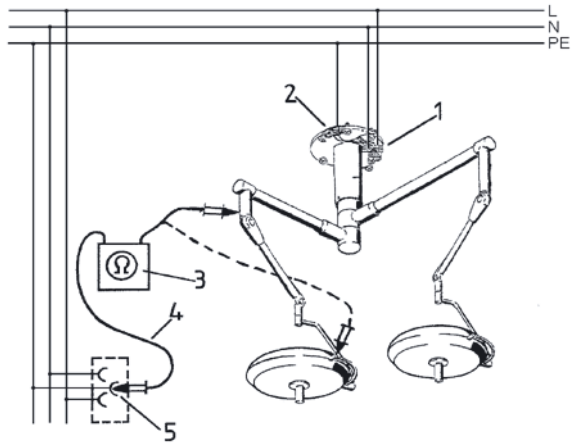
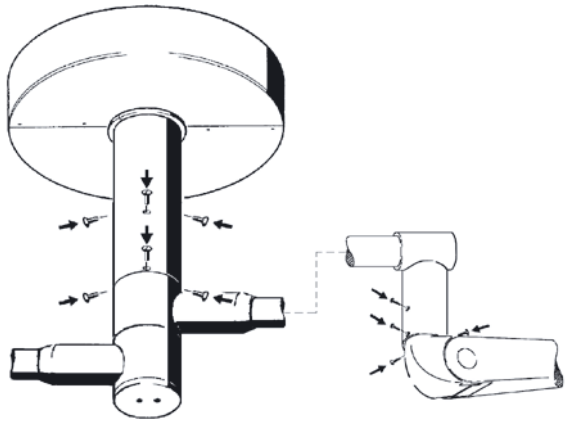


Figure 06



1 Mains supply
2 Main earthed conductor connection
3 Measuring instrument
4 Instrument leads
5 Externally accessible earthed conductor

Figure 07



B Fixed lamp

RR_{imax} = 0.3 ohms

The measuring method via the external earthed conductor should only be used if the ceiling connection is later no longer accessible, e.g. in the case of a laminar flow ceiling system. The prerequisite for this is that (initial installation) point 5 and the resistance value between point 2 and 5 are documented at the first acceptance. Thereafter, the following can be observed during each subsequent repeat measurement:

- If necessary, measure the resistance between the main earthed conductor connection (2) and the nearest earthed conductor connection (5).
- In this case, document the location of the externally accessible earthed conductor (5) and enter the measurement between this place and the main earthed conductor connection (2) in the test report.
- After assembly of the lamp or lamp combination, measure the resistance between point 2 and/or point 5 and all metal parts of the lamp and enter the highest reading in the test report.

Testing the support system

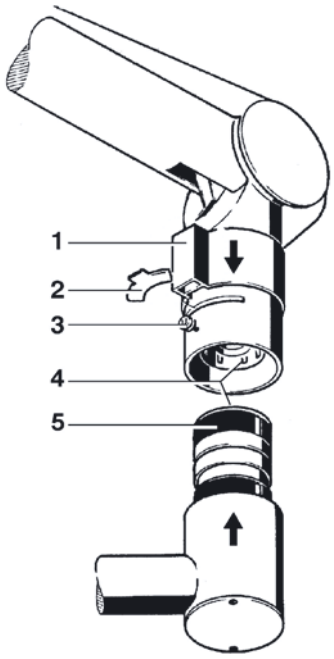
- Checking and securing the retaining screws

- Check the correct assembly and fixing of the six retaining screws of the moving arm on the ceiling tube and the four retaining screws of the spring arm on the moving arm.

WARNING – Falling lighting system:
The moving and spring arms are very heavy and can fall once the retaining screws shown in Figure 7 have been unscrewed!

- If necessary, replace any missing retaining screws and/or fix the screws consecutively with Loctite screw-locking adhesive.

Figure 08



1 Securing sleeve
2 Projecting segment
3 Securing screw
M4 x 8 as per DIN 7985
4 Plug contact
5 Plastic ring

Checking the securing sleeve

- Check the securing sleeve (1) for cracks and distortion and replace if necessary.

Checking the securing screw

- Check that there is a securing screw (3) and that it is the correct length (8 mm).

Checking the projecting segment

- Check that the projecting segment (2) is at least 1.6 mm thick in the area of contact.
- If necessary, replace the projecting segment.
- Lubricate the projecting segment (e.g. with Molycote MOS 2).

Checking the brake screws

- Check the adjustment of the brake screws in the extension arms and in the cardanic suspension.
- If necessary, tighten the brake screws so that the extension arms and light heads can be moved easily, but do not move by themselves.
  When doing so, first read the information in the corresponding assembly instructions.

Checking the adjustment of the spring arm

- Check that the tension is correctly adjusted and check the height limitation of the spring arms.
  When doing so, first read the information in the corresponding assembly instructions.

Checking the rating plate and the warnings

- Check that the rating plate(s) is/are attached and that they are legible.
- Check that the lamps with pilot lasers carry warnings (stickers) and that they are legible.

14.4 Testing the functions of the lamps

Checking the emergency power changeover

- Check that the changeover PCB is functioning properly (if installed) e.g. by activating the building's automatic circuit breakers for the lamp or lamp combination concerned or by removing the fuse holder on the terminal block of the ceiling tube.

Functional check according to the operating instructions

- Carry out a functional check of all operating functions of the lamp or lamp combination.
  When doing so, read the operating instructions that correspond to the lamp type for the optional components (e.g. monitor, camera).

Checking the lamp changeover

A HELION lamp versions:

- With the unit switched off, remove the halogen lamp in the centre of the focus unit and check the proper functioning of the lamp switchover and the error display on the control field after switch-on.
- Check the second error display (for the HELION Standard plus lamp version only) by plugging the halogen lamp into the other socket, with the unit switched off, and then switching it on.
- Put the halogen lamp back and/or replace the halogen lamp(s), with the unit switched off.

B XENION L lamp version:

- Check the switch-on and/or switchover response of the lamp or lamp combination.
  When doing so, first read the corresponding operating instructions.

Checking the luminous field

- Align the light head horizontally and check if, at a distance of one metre from the surface, the lamp produces a round luminous field.

Testing the luminous intensity

- Measure the luminous intensity at the smallest luminous field and without dimming at a distance of one metre from the surface.

- Luminous intensity setpoint ranges:

Designation	E_c
- HELION S	30 to 40 K-Lux
- HELION M	70 to 95 K-Lux
- HELION L	120 to 140 K-Lux
- XENION L	145 to 160 K-Lux
- HELION XL	125 to 145 K-Lux

Enter the values recorded in the test report.

Testing the lamp voltage at rated load

- Measure the lamp voltage at rated load. Read the descriptions of the two measuring methods that are dependent on the lamp type in the corresponding assembly instructions.
- Take the data from the corresponding circuit diagrams.

If the surgical lamp and/or lamp combination has safety defects, it must be shut down and secured against undesired activation using appropriate measures (e.g. removal of the mains fuses, erecting and/or attaching warning signs)!

15 Technical Description

15.1 Data sheets

Please refer to the following data sheets for the technical description of the lighting system. Data sheets are available from your sales partner.

Lamp designation	Technical data sheets
HELION XL+	D 7201017
HELION XL+ / M	D 7201036
HELION XL+ / L+	D 7201039
HELION XL+ / L	D 7201038
HELION XL+ / S	D 7201035
HELION XL+ / M+	D 7201037
HELION XL+ / M / M	D 7201053

Lamp designation	Technical data sheets
HELION S Ceiling	D 7201001
HELION S Mobile 100-127 V	D 7201002
HELION S Wall	D 7201004
HELION S Mobile 230 V	D 7201002
HELION M+/M+	D 7201024
HELION M+ / M+ / M+	D 7201042
HELION M+	D 7201006
HELION M	D 7201005
HELION M / M	D 7201022
HELION M Wall	D 7201008
HELION M/S	D 7201020
HELION M+/S	D 7201021
HELION M+/M	D 7201023
HELION M / M / M	D 7201040
HELION M+ / M / M	D 7201041
HELION M+ Mobile	D 7201010
HELION M Mobile	D 7201009
HELION M+ Hospital	D 7201019
HELION M Hospital	D 7201018
HELION L+ Hospital	D 7201055
HELION L Hospital	D 7201054

15.1 Data sheets (cont.)

Please refer to the following data sheets for the technical description of the lighting system. Data sheets are available from your sales partner.

Lamp designation	Technical data sheets
HELION L+ / L+	D 7201032
HELION L+	D 7201012
HELION L+/ M+	D 7201029
HELION L+ / L+ / M+	D 7201048
HELION L	D 7201011
HELION L+/M	D 7201028
HELION L+ / L	D 7201031
HELION L / M	D 7201027
HELION L / L	D 7201030
HELION L+ / L+ / L+	D 7201050
HELION L / L / L	D 7201045
HELION L / M / M	D 7201043
HELION L / L / M	D 7201044
HELION L/S	D 7201025
HELION L+ / M / M	D 7201046
HELION L+ / M+ / M+	D 7201047
HELION L+ / L / L	D 7201049
HELION L+/S	D 7201026

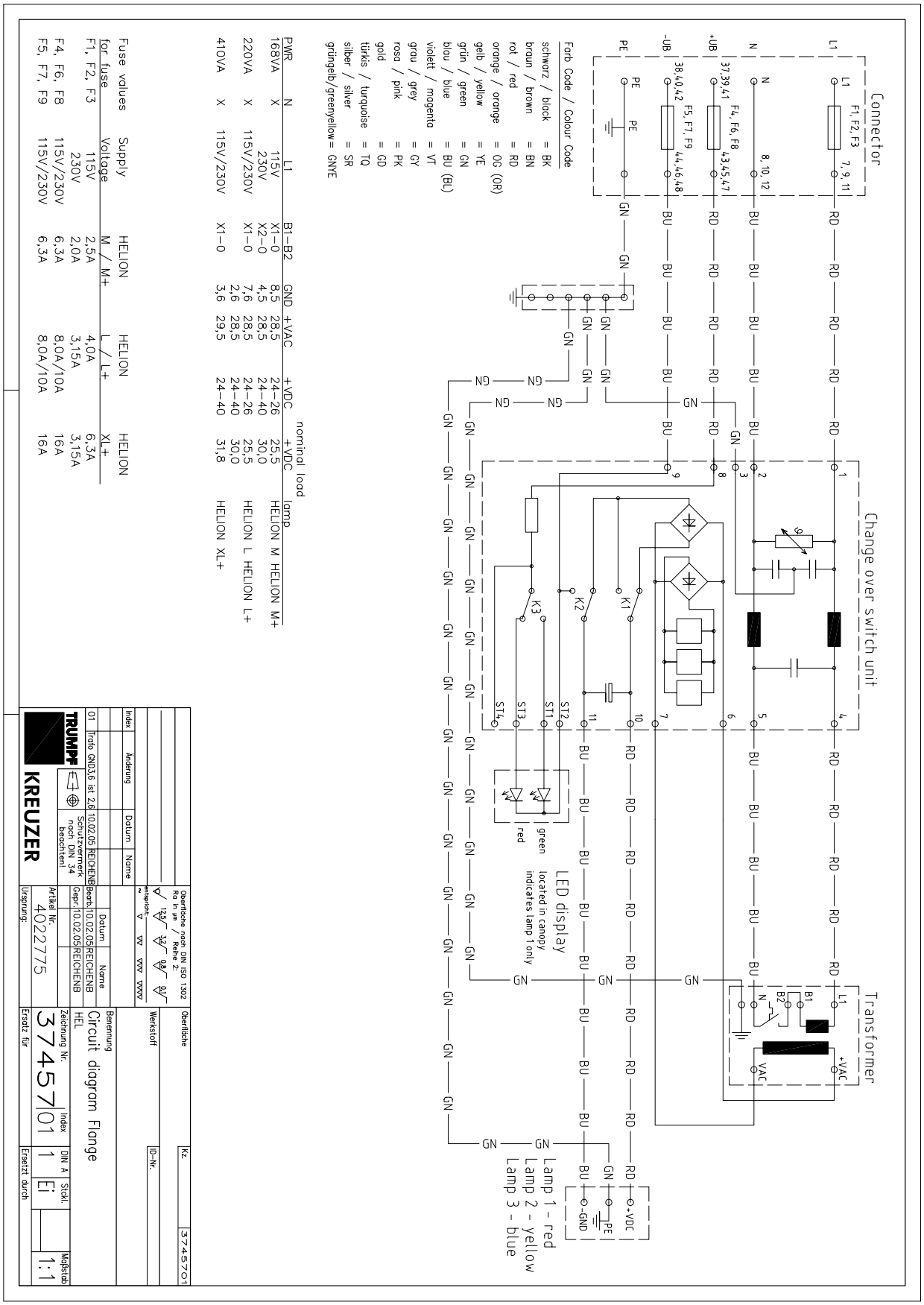
Lamp designation	Technical data sheets
HELION L+ Mobile	D 7201014
HELION L Mobile	D 7201013

Lamp designation	Technical data sheets
XENION L+ / L+ / L+	D 7201052
XENION L+ / L+ / M+	D 7201051
XENION L+ / L+	D 7201033
XENION L+	D 7201015
XENION L+ / M+	D 7201034
XENION L+ Mobile	D 7201016
XENION L+ / M+ / M+	D 7201056

15 Technical Description

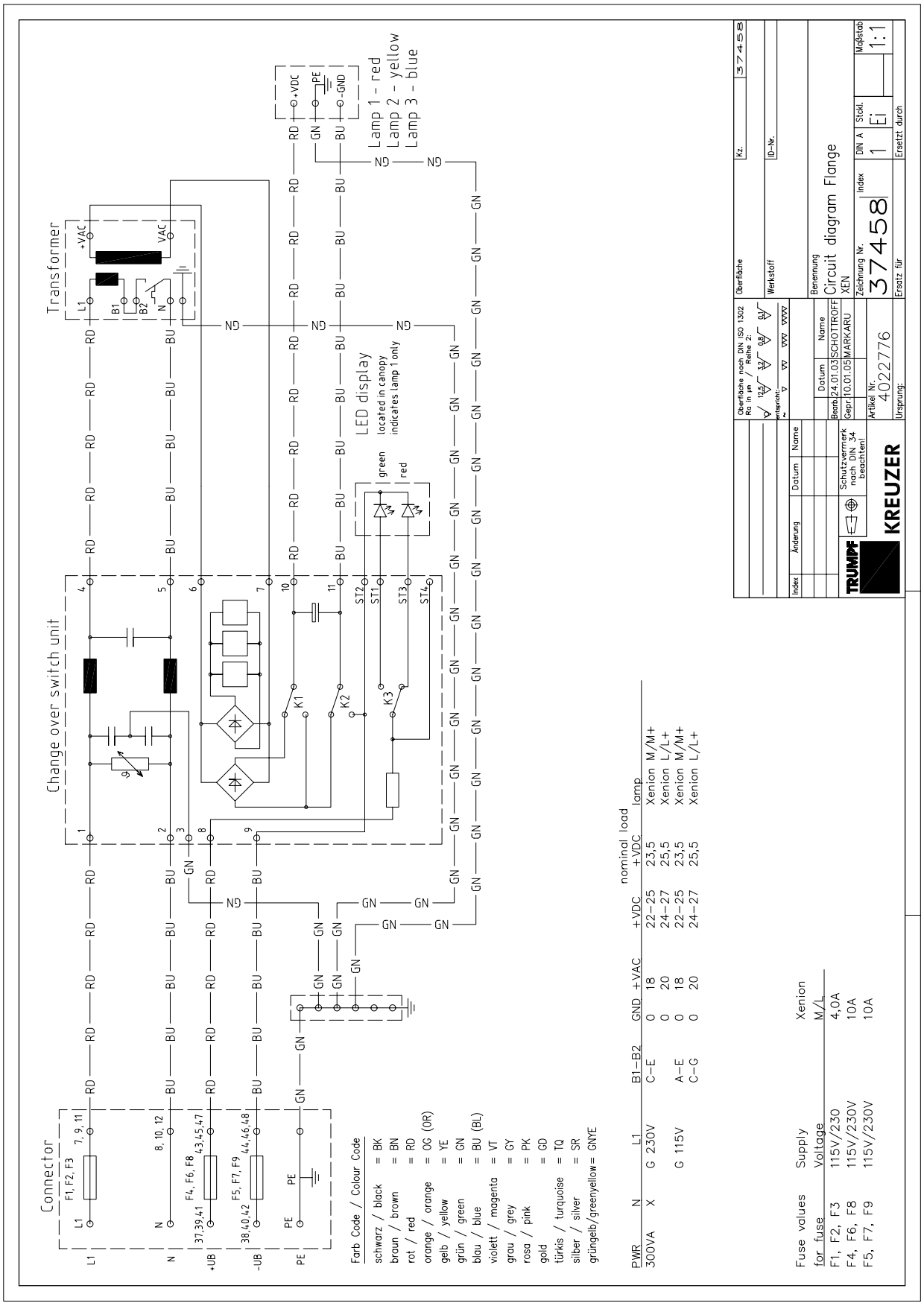
15.2 Circuit diagrams and set values

15.2.1 HELION M/M+; HELION L/L+; HELION XL+



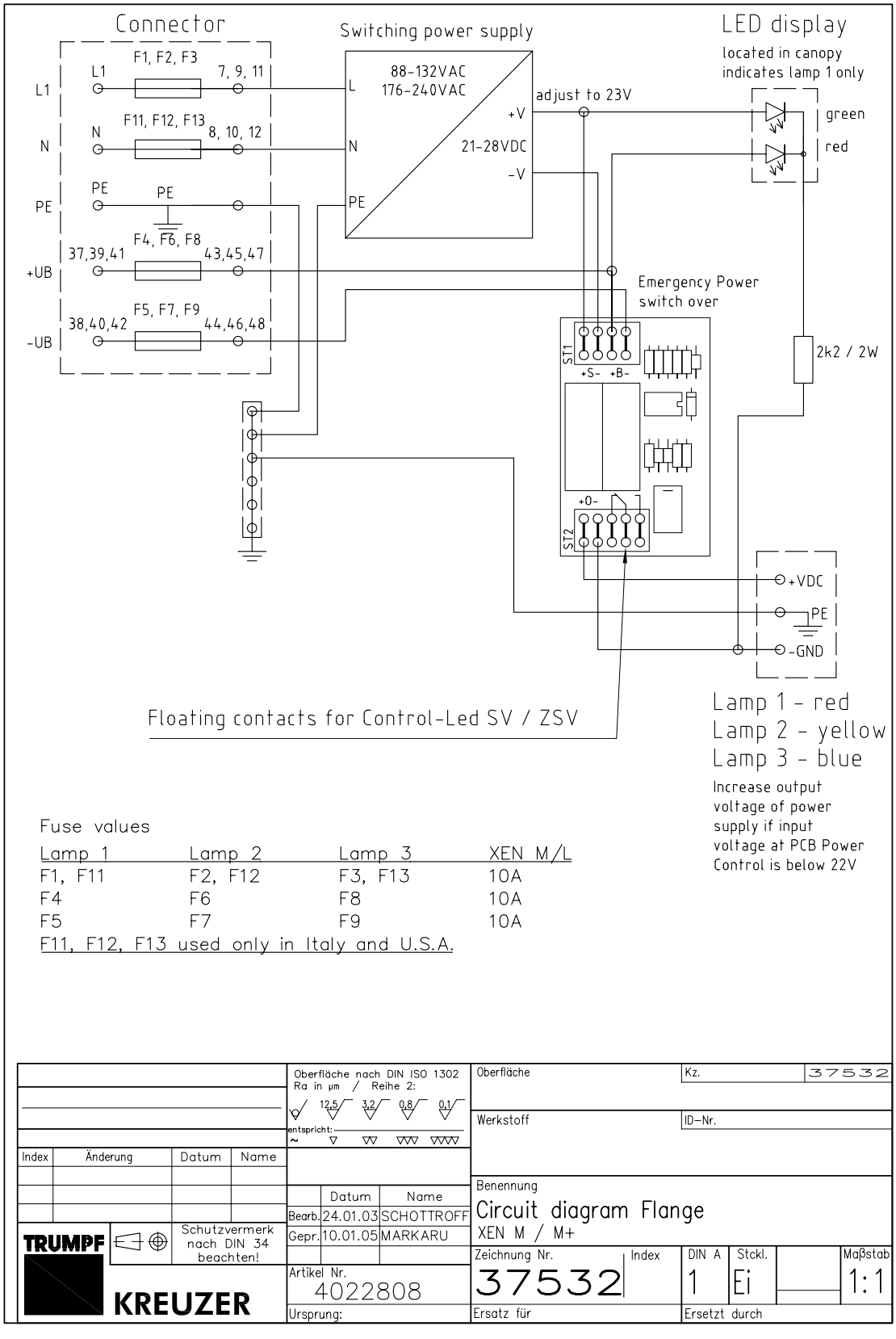
15.2 Circuit diagrams and set values (cont.)

15.2.2 XENION M/M+; XENION L/L+


Transformer
Change over switch unit
LED display
located in canopy
indicates lamp 1 only
green
red
Lamp 1 - red
Lamp 2 - yellow
Lamp 3 - blue
Connector
Circuit diagram Flange
XEN
37458
4022776
KREUZER
Farb Code / Colour Code
schwarz / black = BK
braun / brown = BN
rot / red = RD
orange / orange = OG (OR)
gelb / yellow = YE
grün / green = GN
blau / blue = BU (BL)
violett / magenta = VT
grau / grey = GY
rosa / pink = PK
gold = GD
türkis / turquoise = TQ
silber / silver = SR
grüngelb/greenyellow = GNYE
PWR N L1 B1–B2 GND +VAC +VDC +VDC lamp
300VA X G 230V C–E 0 18 22–25 23,5 Xenion M/M+
0 20 24–27 25,5 Xenion L/L+
G 115V A–E 0 18 22–25 23,5 Xenion M/M+
C–G 0 20 24–27 25,5 Xenion L/L+
nominal load
Fuse values for fuse
Supply Voltage
Xenion M/L+
F1, F2, F3 115V/230 4,0A
F4, F6, F8 115V/230V 10A
F5, F7, F9 115V/230V 10A

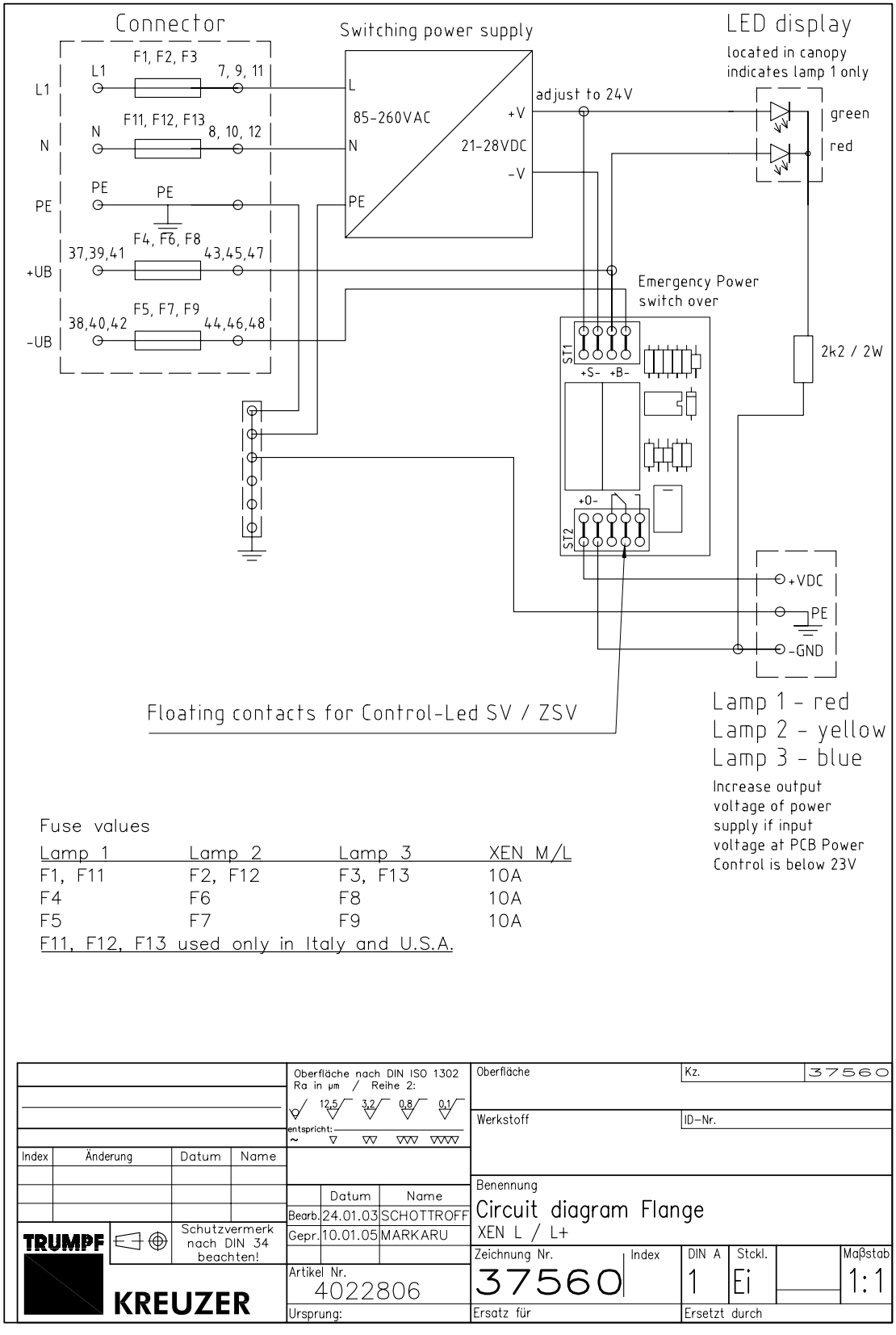
15.2 Circuit diagrams

15.2.3 XENION M / M+



15.2 Circuit diagrams (cont.)

15.2.4 XENION L/L+



Fuse values

Lamp 1	Lamp 2	Lamp 3	XEN M/L
F1, F11	F2, F12	F3, F13	10A
F4	F6	F8	10A
F5	F7	F9	10A

F11, F12, F13 used only in Italy and U.S.A.

Index	Änderung	Datum	Name

Schutzvermerk nach DIN 34 beachten!

TRUMPF KREUZER

Oberfläche nach DIN ISO 1302
Ra in µm / Reihe 12,5 3,2 0,8 0,1
entspricht:

	Datum	Name
Bearb.	24.01.03	SCHOTTROFF
Gepr.	10.01.05	MARKARU

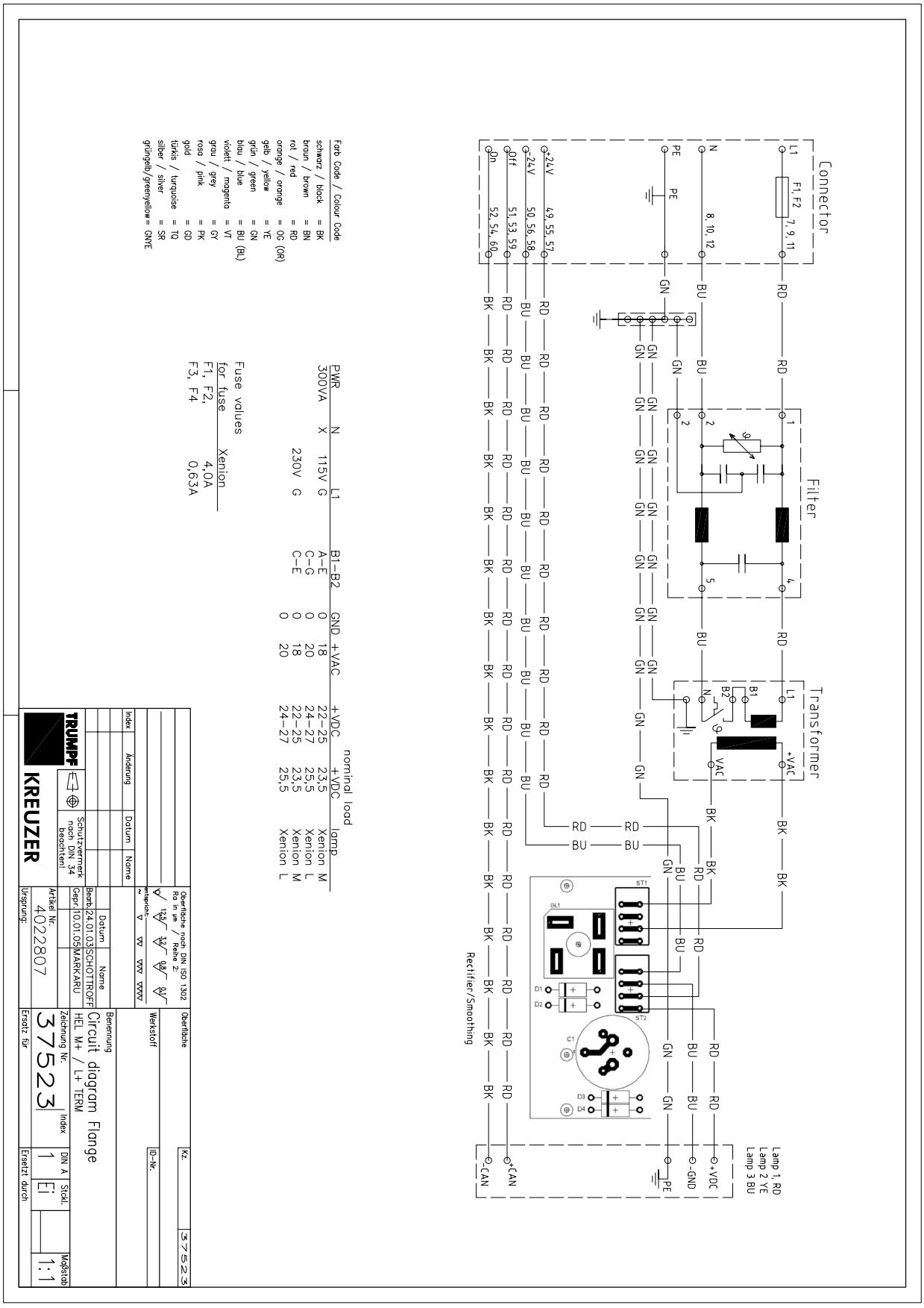
Artikel Nr. 4022806
Ursprung:

Oberfläche | Kz. 37560
Werkstoff | ID-Nr.
Benennung
Circuit diagram Flange
XEN L / L+
Zeichnung Nr. 37560 | Index | DIN A 1 | Stckl. Ei | Maßstab 1:1
Ersatz für | Ersetzt durch

15 Technical Description

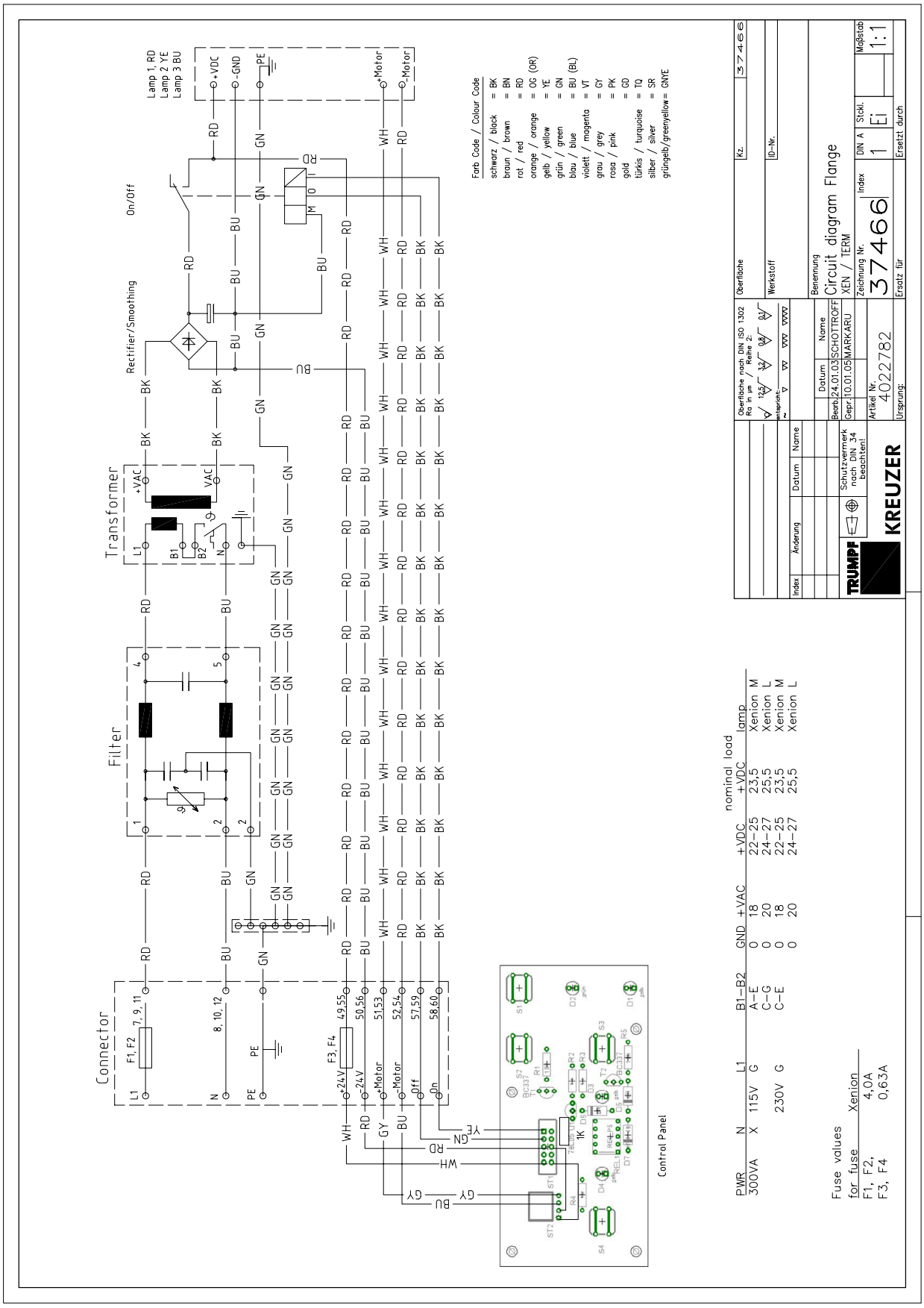
15.2 Circuit diagrams and set values (cont.)

15.2.5 HELION M+; HELION L+ with wall control panel



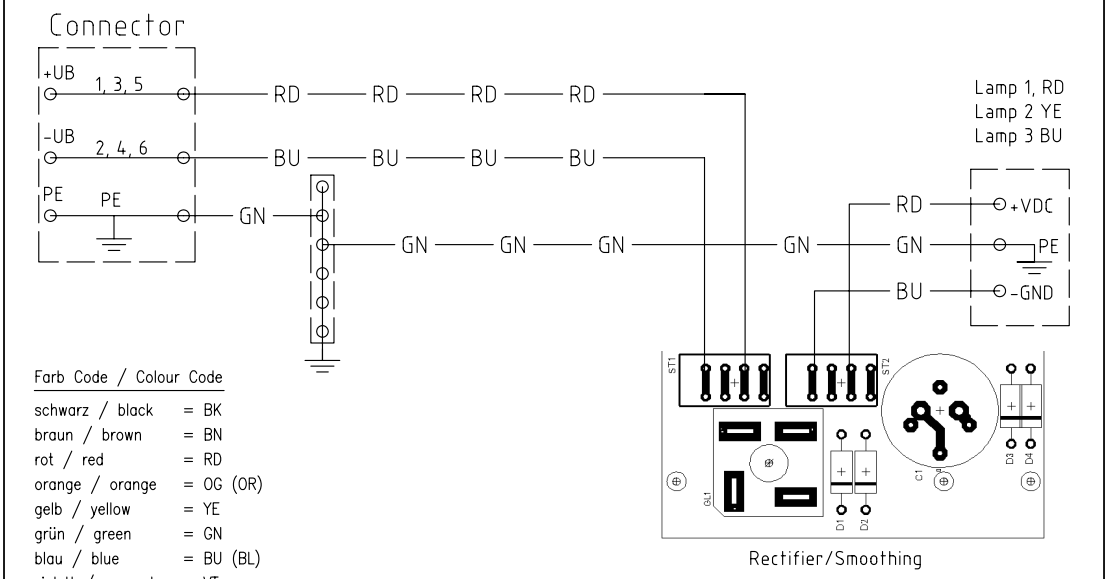
15.2 Circuit diagrams and set values (cont.)

15.2.6 XENION M/M+ ; XENION L/L+ with wall control panel



15.2 Circuit diagrams and set values (cont.)

15.2.7 24 V supply AC/DC HELION M/M+; HELION L/L+ ; HELION XL+; XENION M/M+; XENION L/L+



Farb Code / Colour Code

schwarz / black	= BK
braun / brown	= BN
rot / red	= RD
orange / orange	= OG (OR)
gelb / yellow	= YE
grün / green	= GN
blau / blue	= BU (BL)
violett / magenta	= VT
grau / grey	= GY
rosa / pink	= PK
gold	= GD
türkis / turquoise	= TQ
silber / silver	= SR
grüngelb/greenyellow	= GNYE

Lamp	VAC×	+VDC	+VDC at nominal load
Helion M	17-18,5	24-26	25,5
Helion M+	17-22	24-30	28,5
Helion L	17-18,5	24-26	25,5
Helion L+	17-22	24-30	28,5
Xenion M	16-18	22-25	23,5
Xenion L	17-19	24-27	25,5
Helion XL+	17-22	24-30	28,5

× do not exxed +VDC at nominal load when operating AC

Index	Änderung	Datum	Name

Oberfläche nach DIN ISO 1302 Ra in µm / Reihe 2: 12,5 3,2 0,8 0,1 entspricht: ~ ▽ ▽▽ ▽▽▽ ▽▽▽▽

	Datum	Name
Bearb.	24.01.03	SCHOTTROFF
Gepr.	10.01.05	MARKARU

Artikel Nr. 4022780

Ursprung:

Oberfläche | Kz. 37465

Werkstoff | ID-Nr.

Benennung: Circuit diagram Flange 24 V AC/DC HEL / XEN

Zeichnung Nr.	Index	DIN A	Stckl.		Maßstab
37465		1	Ei		1:1

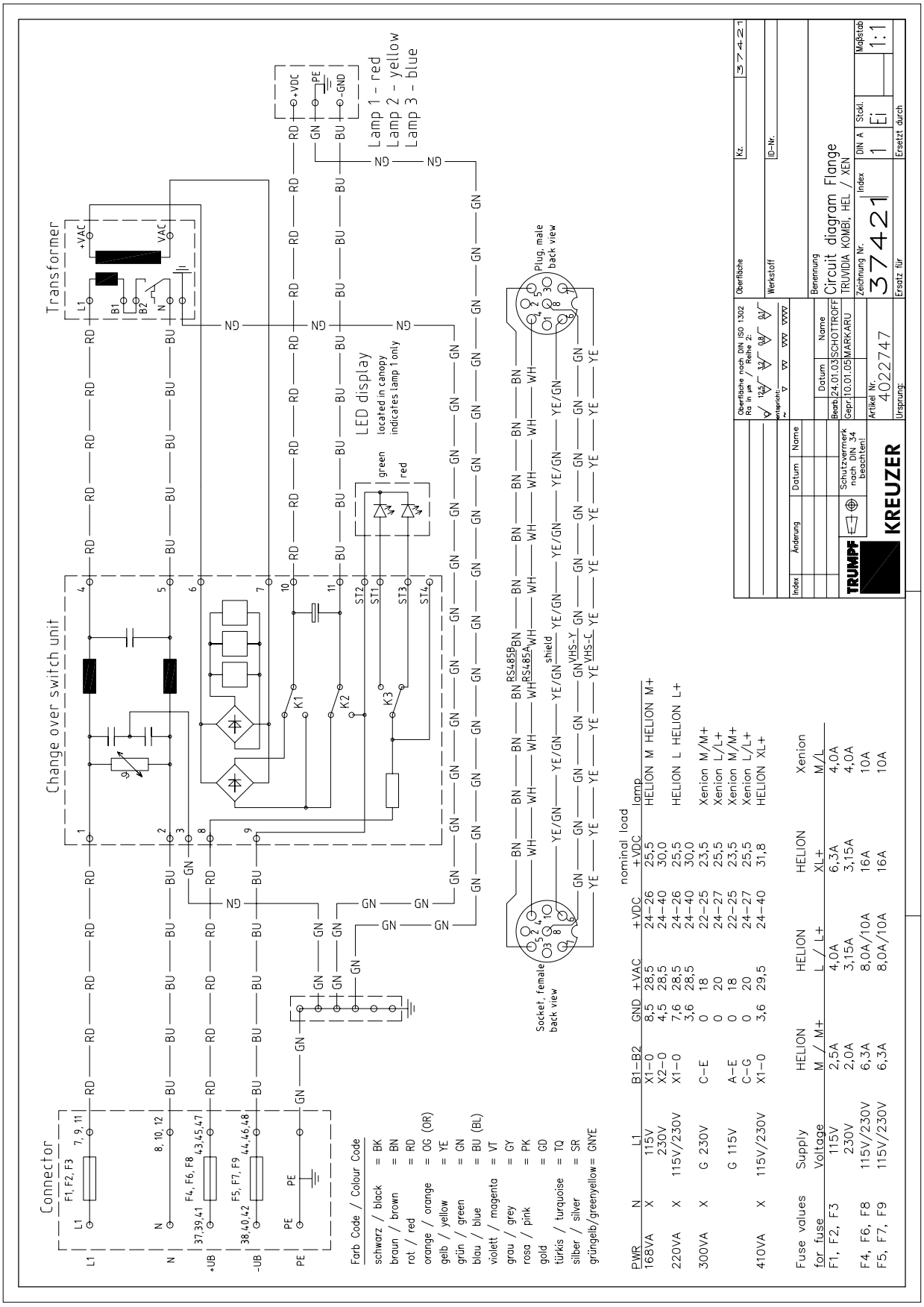
Ersatz für | Ersetzt durch

TRUMPF KREUZER

Schutzvermerk nach DIN 34 beachten!

15.2 Circuit diagrams and set values (cont.)

15.2.8 Combination TruVidia with HELION M/M+; HELION L/L+; HELION XL+; XENION M/M+; XENION L/L+ lamps



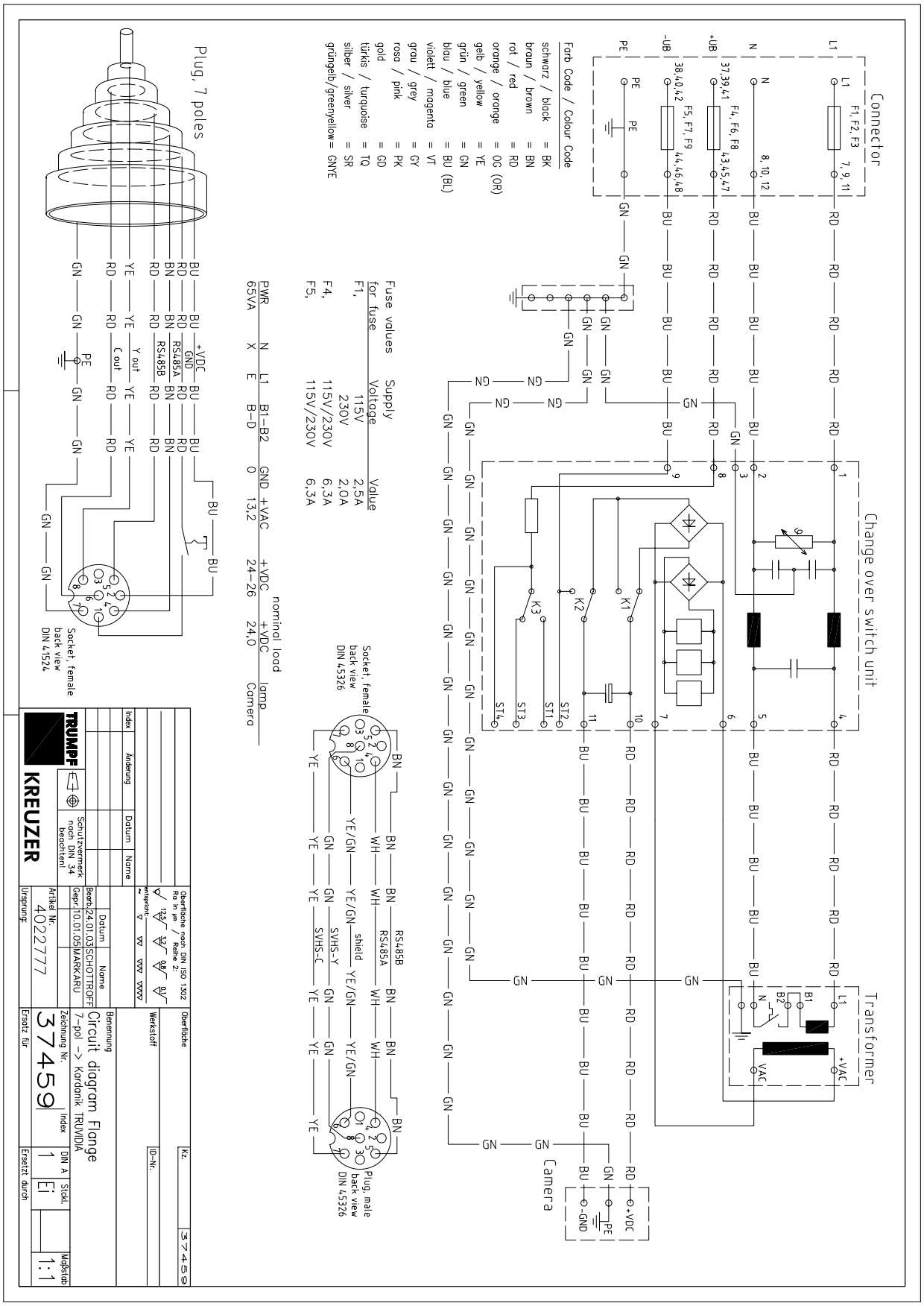
PWR	N	L1	B1–B2	GND	+VAC	+VDC	nominal load +VDC lamp	
168VA	X	115V	X1–0	8,5	28,5	24–26	25,5	HELION M HELION M+
		230V	X2–0	4,5	28,5	24–40	30,0	
220VA	X	115V/230V	X1–0	7,6	28,5	24–26	25,5	HELION L HELION L+
				3,6	28,5	24–40	30,0	
300VA	X	G 230V	C–E	0	18	22–25	23,5	Xenion M/M+
				0	20	24–27	25,5	Xenion L/L+
		G 115V	A–E	0	18	22–25	23,5	Xenion M/M+
			C–G	0	20	24–27	25,5	Xenion L/L+
410VA	X	115V/230V	X1–0	3,6	29,5	24–40	31,8	HELION XL+

Fuse values for fuse	Supply Voltage	HELION M / M+	HELION L / L+	HELION XL+	Xenion M/L
F1, F2, F3	115V	2,5A	4,0A	6,3A	4,0A
	230V	2,0A	3,15A	3,15A	4,0A
F4, F6, F8	115V/230V	6,3A	8,0A/10A	16A	10A
F5, F7, F9	115V/230V	6,3A	8,0A/10A	16A	10A

15 Technical Description

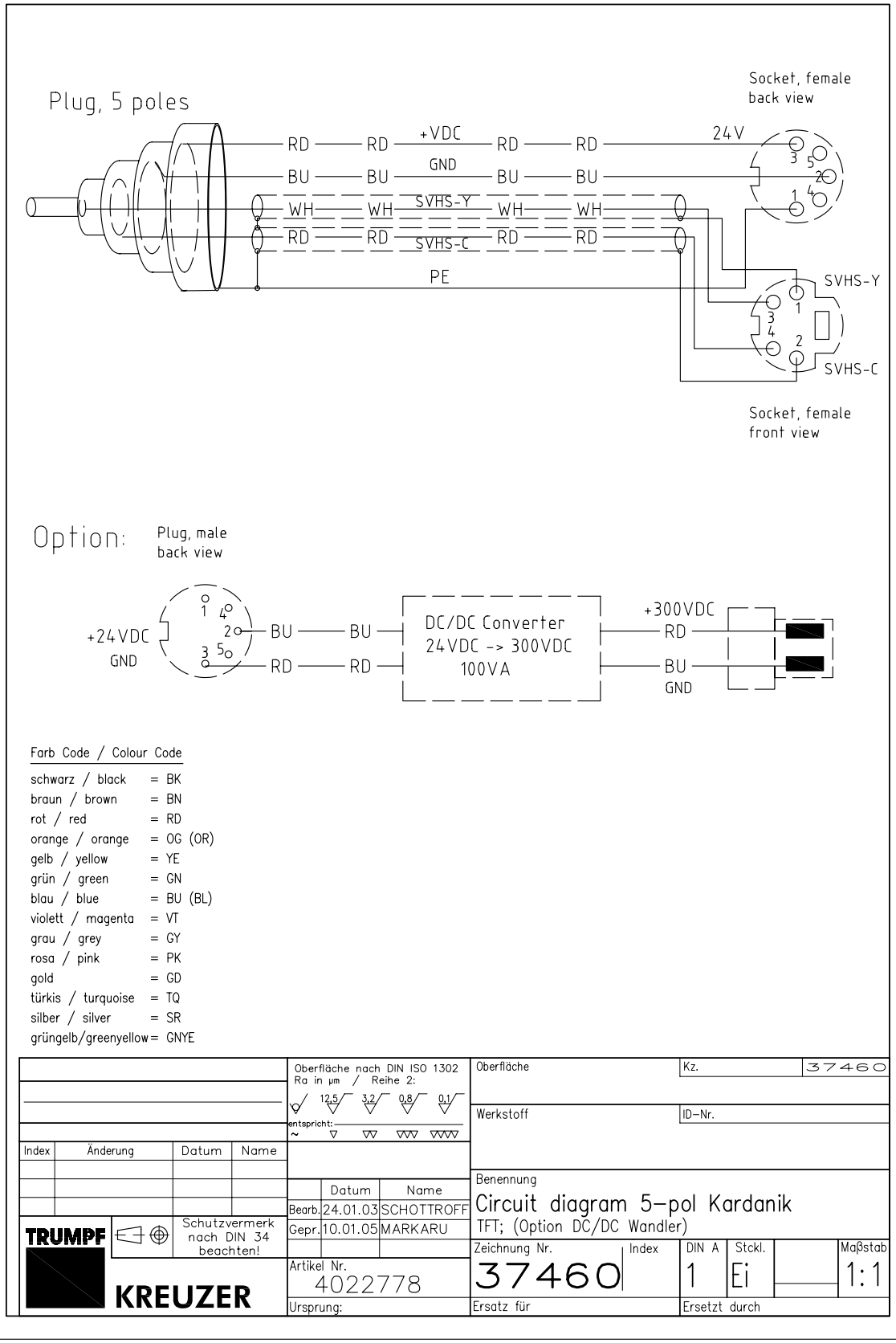
15.2 Circuit diagrams and set values (cont.)

15.2.9 7-pole plug -> cardanic suspension 8-pole DIN socket TruVidia



15.2 Circuit diagrams and set values (cont.)

15.2.10 5-pole plug cardanic suspension TFT LCD monitor; (optional DC/DC converter)



Farb Code / Colour Code

schwarz / black	= BK
braun / brown	= BN
rot / red	= RD
orange / orange	= OG (OR)
gelb / yellow	= YE
grün / green	= GN
blau / blue	= BU (BL)
violett / magenta	= VT
grau / grey	= GY
rosa / pink	= PK
gold	= GD
türkis / turquoise	= TQ
silber / silver	= SR
grüngelb/greenyellow	= GNYE

Index	Änderung	Datum	Name

Schutzvermerk nach DIN 34 beachten!

TRUMPF KREUZER

Oberfläche nach DIN ISO 1302
Ra in µm / Reihe 2:
entspricht: 12,5 3,2 0,8 0,1

	Datum	Name
Bearb.	24.01.03	SCHOTTROFF
Gepr.	10.01.05	MARKARU

Artikel Nr. 4022778
Ursprung:

Oberfläche | Kz. 37460
Werkstoff | ID-Nr.

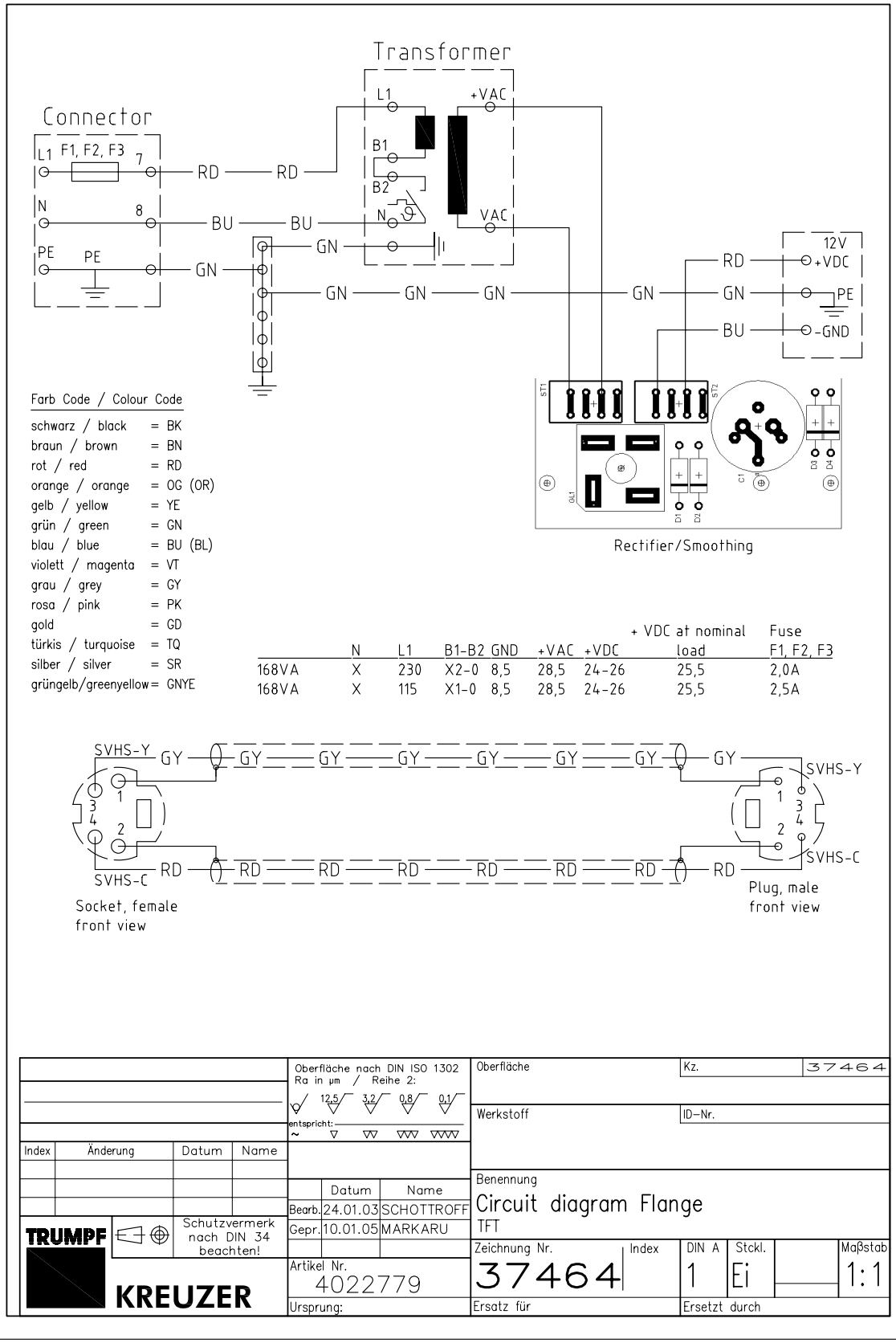
Benennung
Circuit diagram 5-pol Kardanik
TFT; (Option DC/DC Wandler)

Zeichnung Nr.	Index	DIN A	Stckl.	Maßstab
37460		1	Ei	1:1

Ersatz für | Ersetzt durch

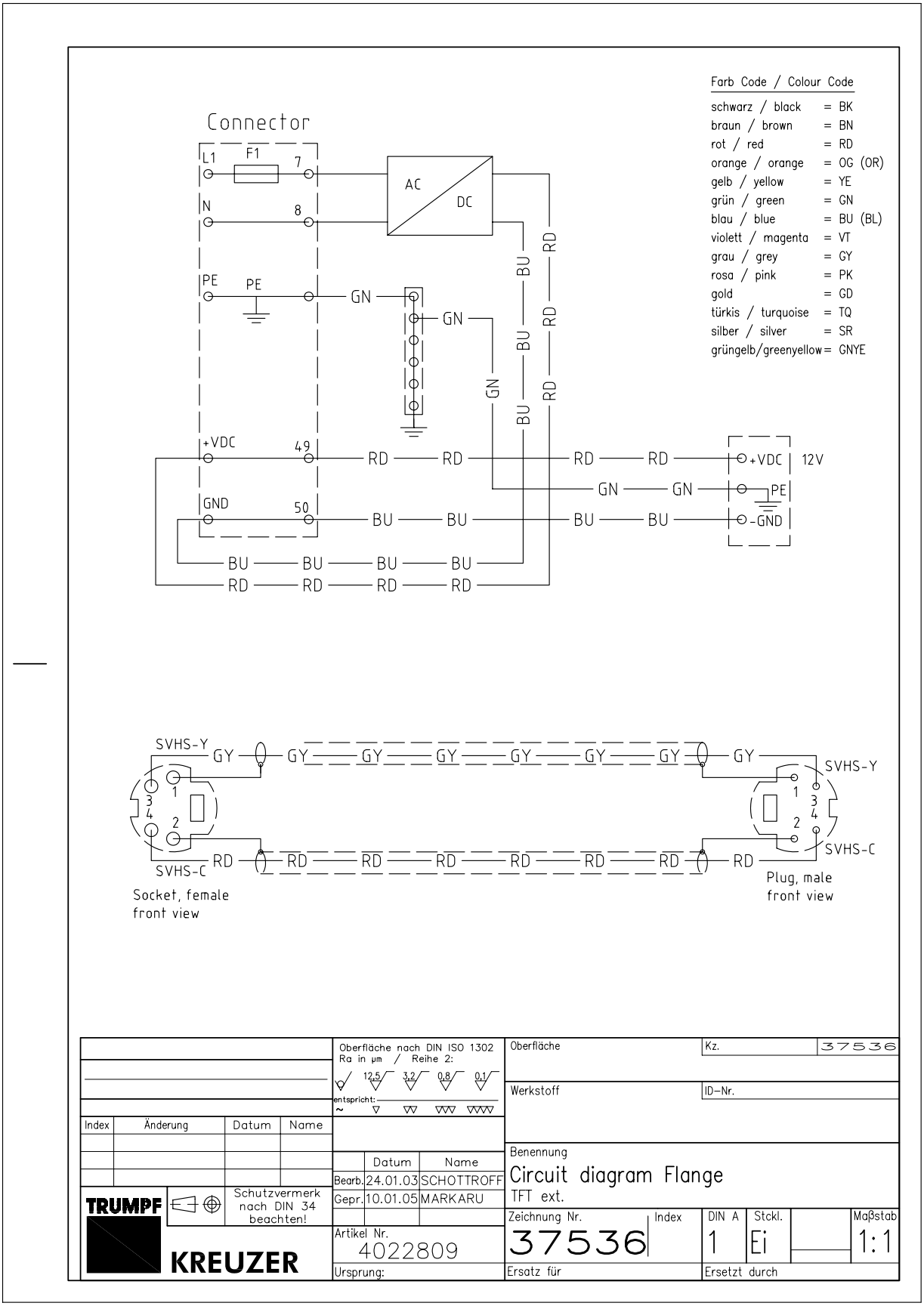
15.2 Circuit diagrams and set values (cont.)

15.2.11 TFT LCD monitor



15.2 Circuit diagrams and set values (cont.)

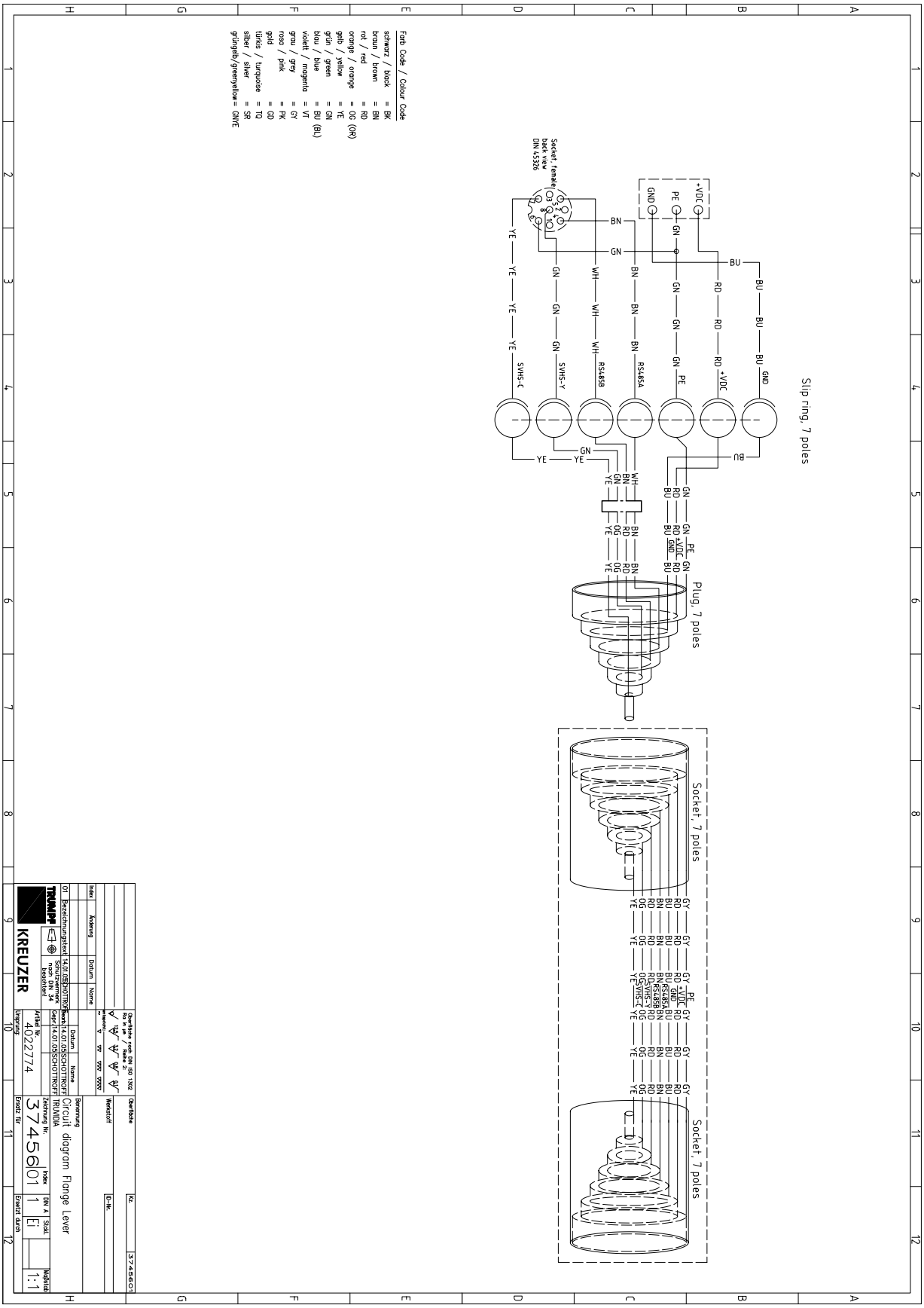
15.2.12 TFT LCD monitor with monitor power supply unit



15 Technical Description

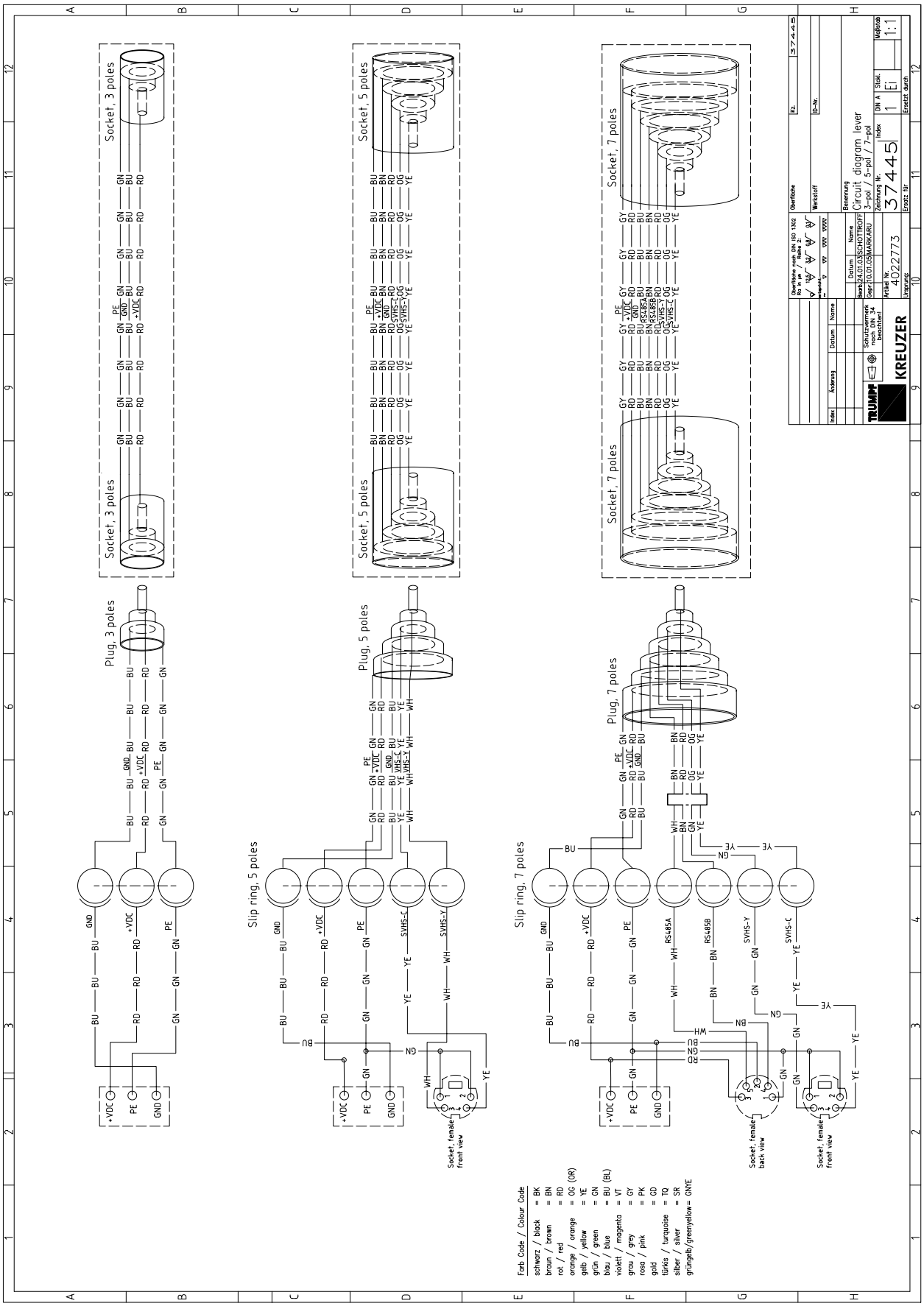
15.2 Circuit diagrams and set values (cont.)

15.2.13 Plug connector -> TruVidia spring arm



15.2 Circuit diagrams and set values (cont.)

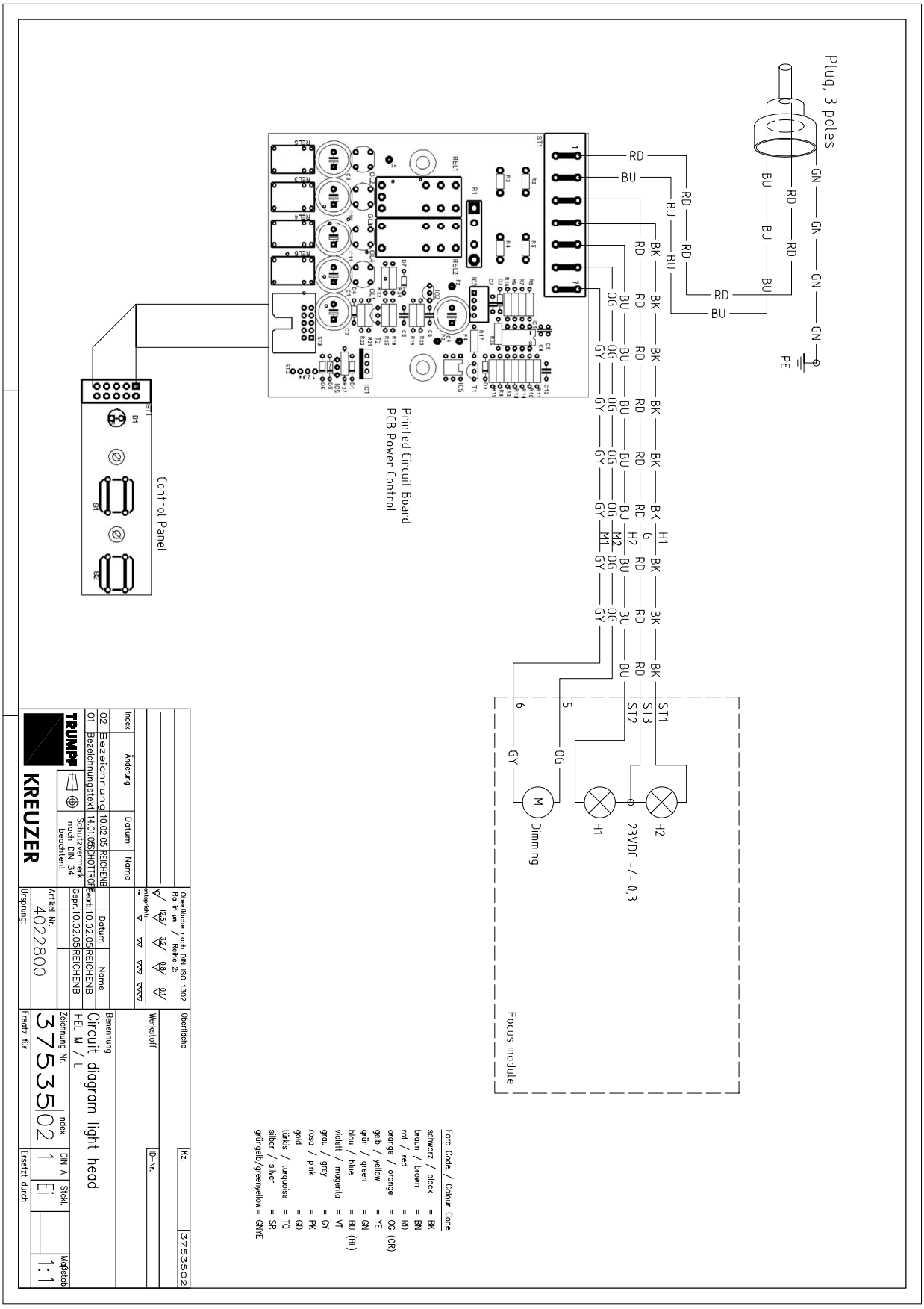
15.2.14 Plug connector -> spring arms 3-pole / 5-pole / 7-pole



15 Technical Description

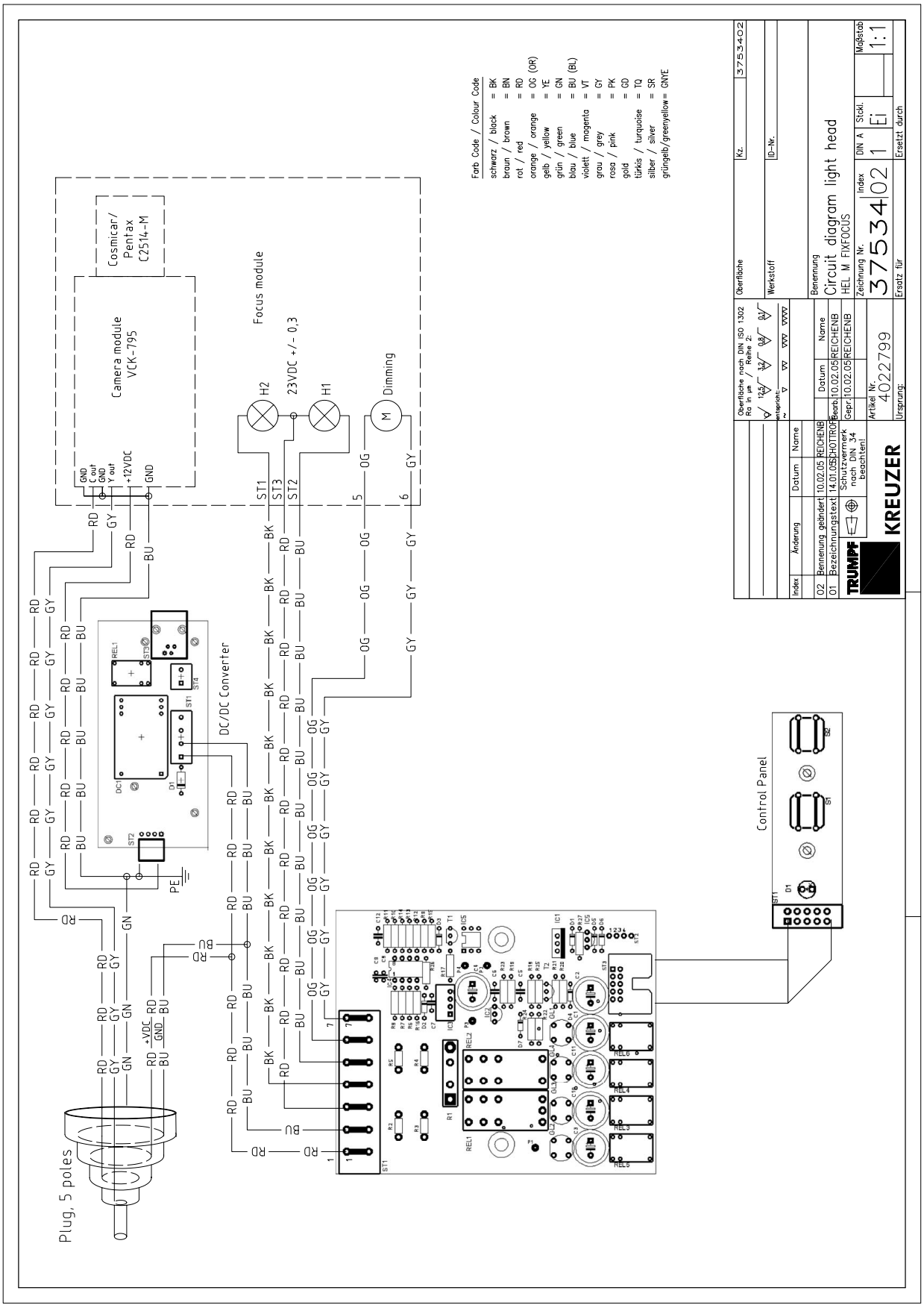
15.2 Circuit diagrams and set values (cont.)

15.2.15 HELION M/L light head



15.2 Circuit diagrams and set values (cont.)

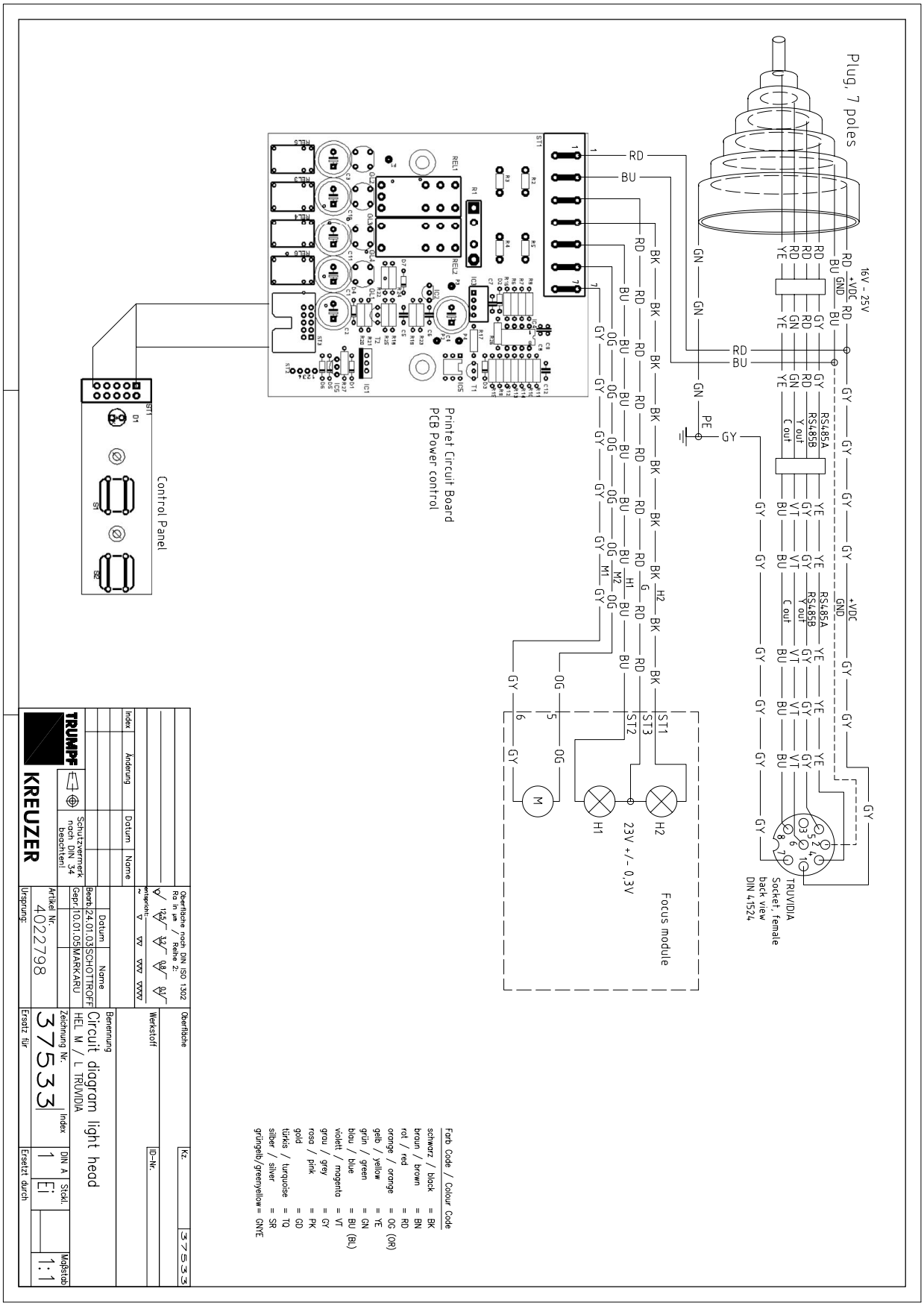
15.2.16 HELION M/L light head with fixed focus camera



15 Technical Description

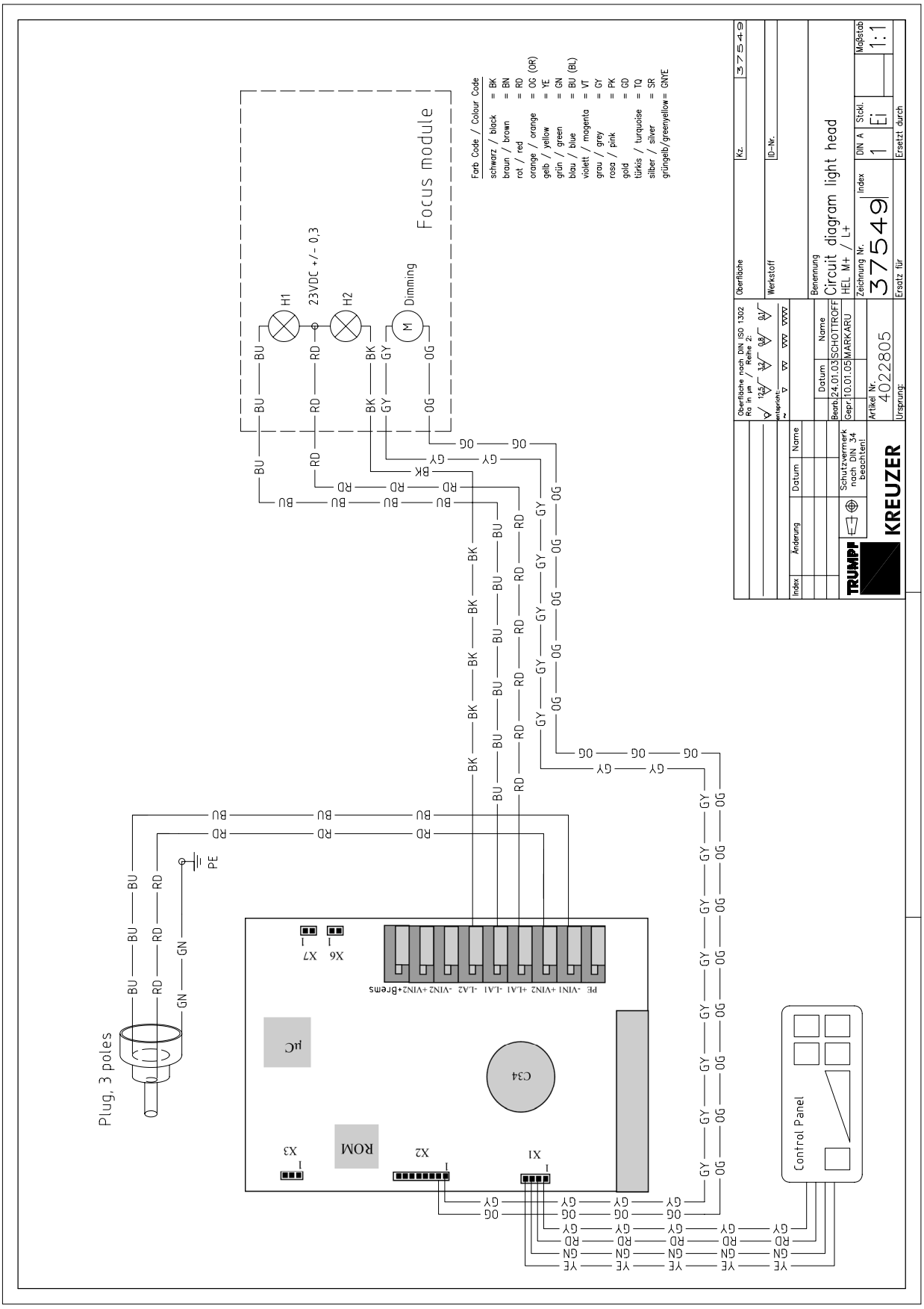
15.2 Circuit diagrams and set values (cont.)

15.2.17 HELION M/L light head with TruVidia



15.2 Circuit diagrams and set values (cont.)

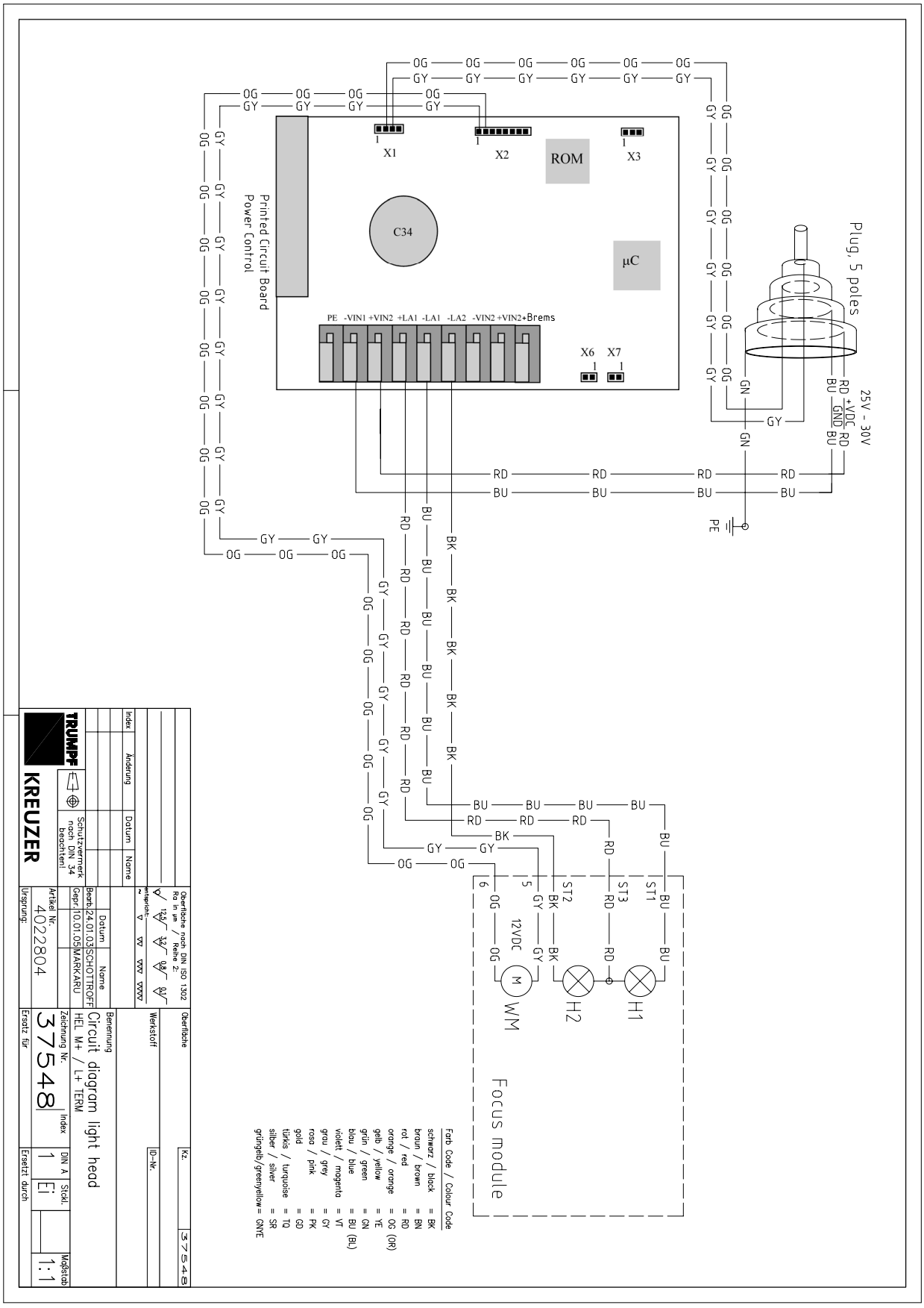
15.2.18 HELION M+/L+ light head



15 Technical Description

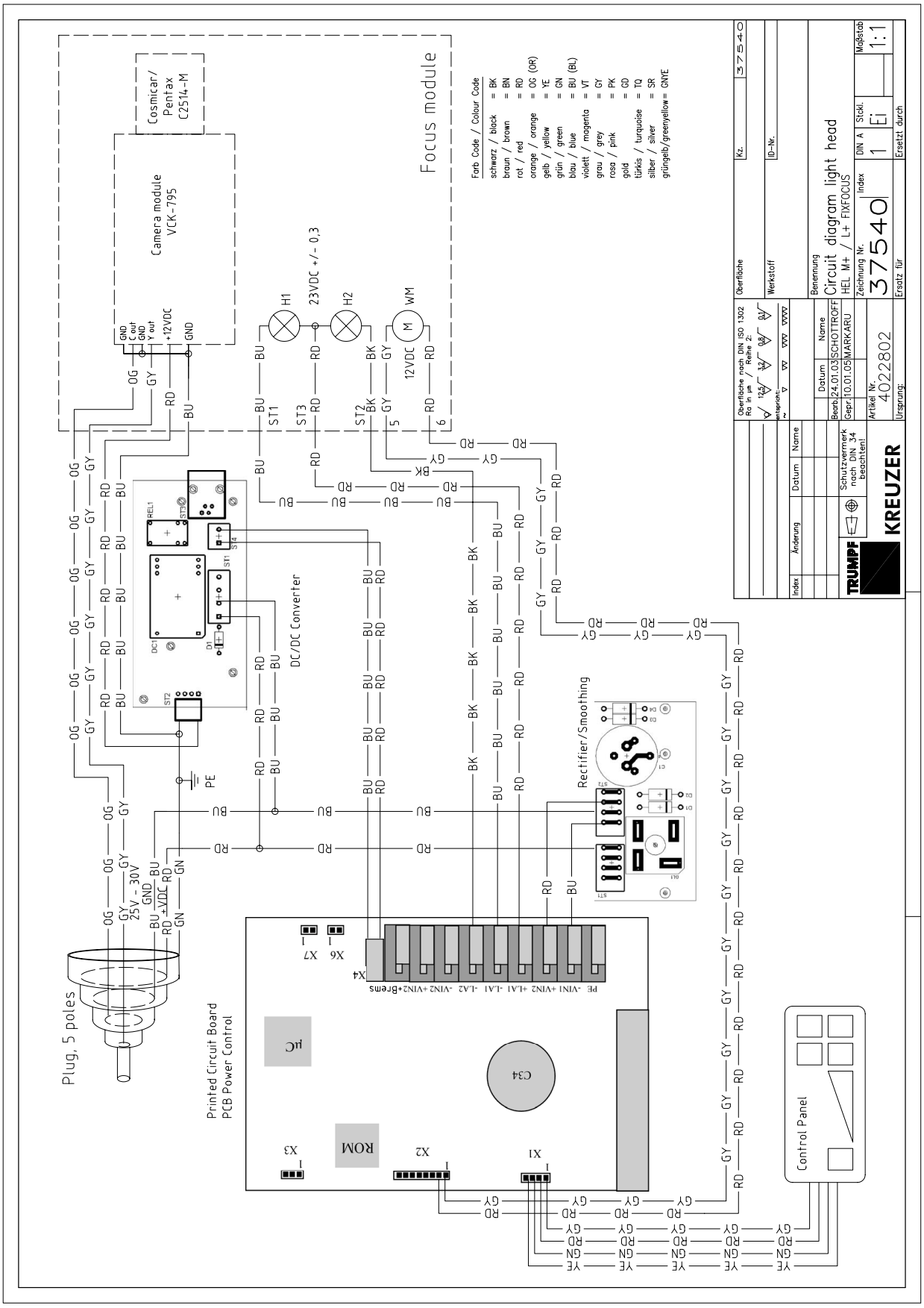
15.2 Circuit diagrams and set values (cont.)

15.2.19 HELION M+/L+ light head with wall control panel



15.2 Circuit diagrams and set values (cont.)

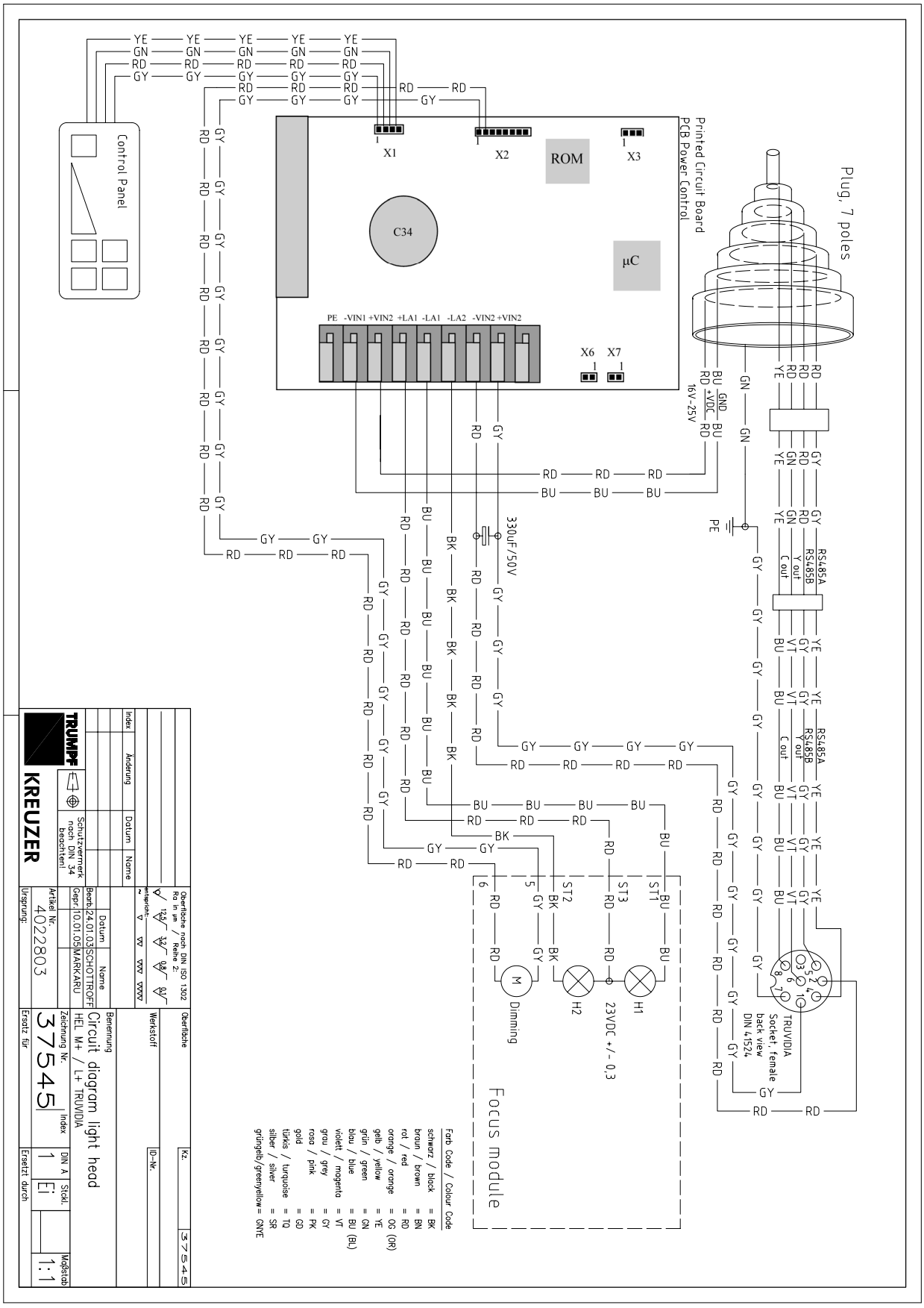
15.2.20 HELION M+/L+ light head with fixed focus camera



15 Technical Description

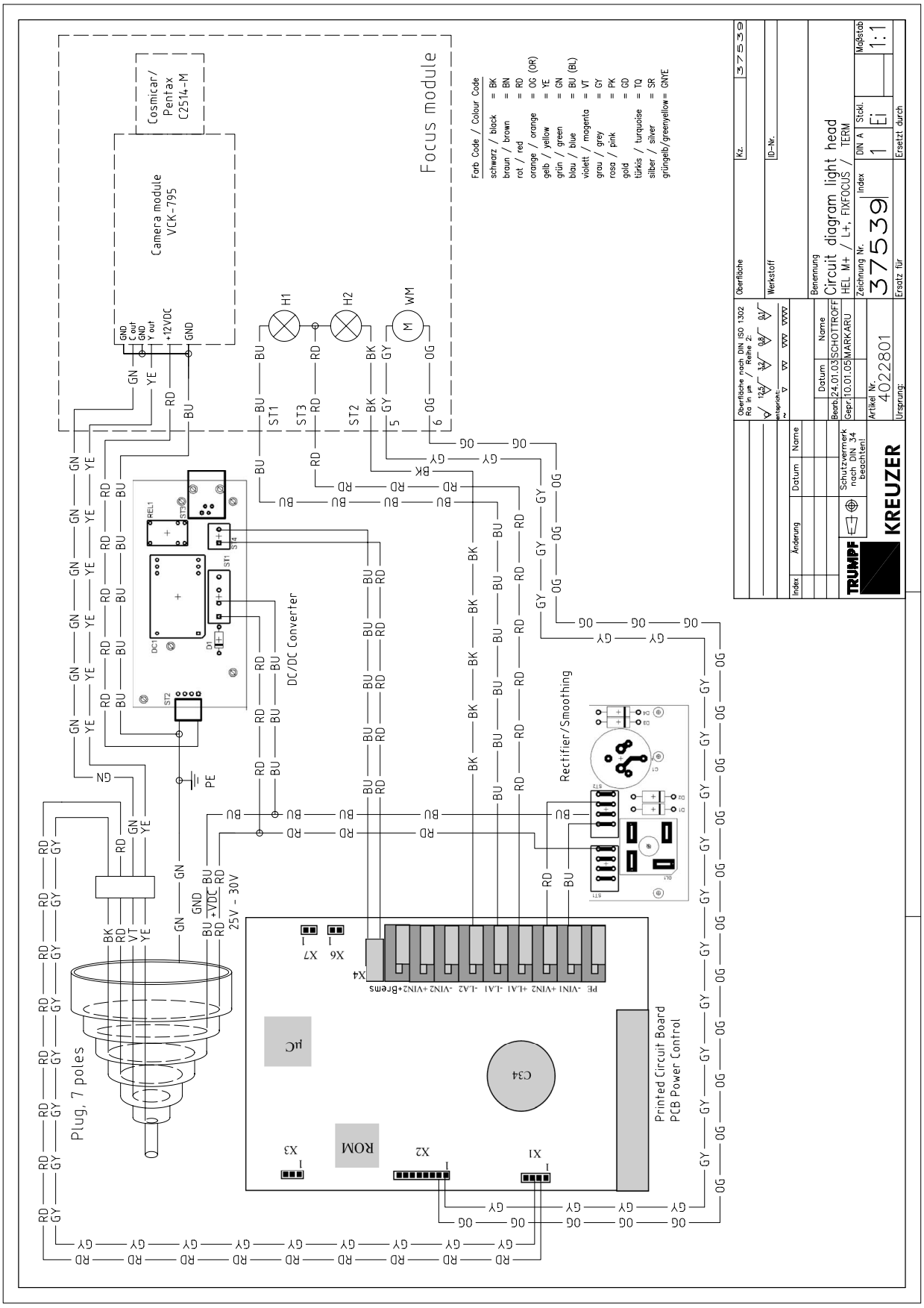
15.2 Circuit diagrams and set values (cont.)

15.2.21 HELION M+/L+ light head with TruVidia



15.2 Circuit diagrams and set values (cont.)

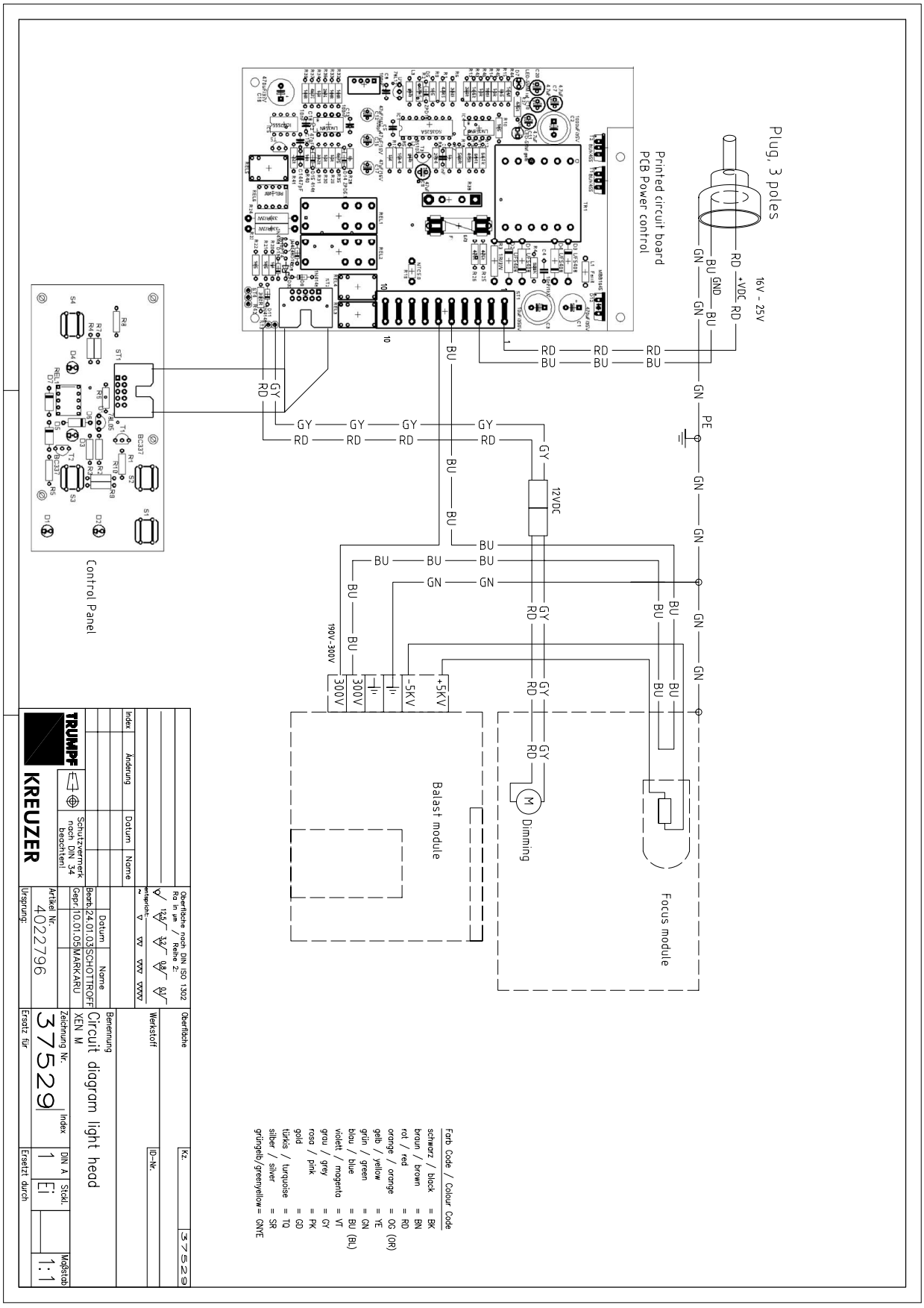
15.2.22 HELION M+/L+ light head with fixed focus camera and wall control panel



15 Technical Description

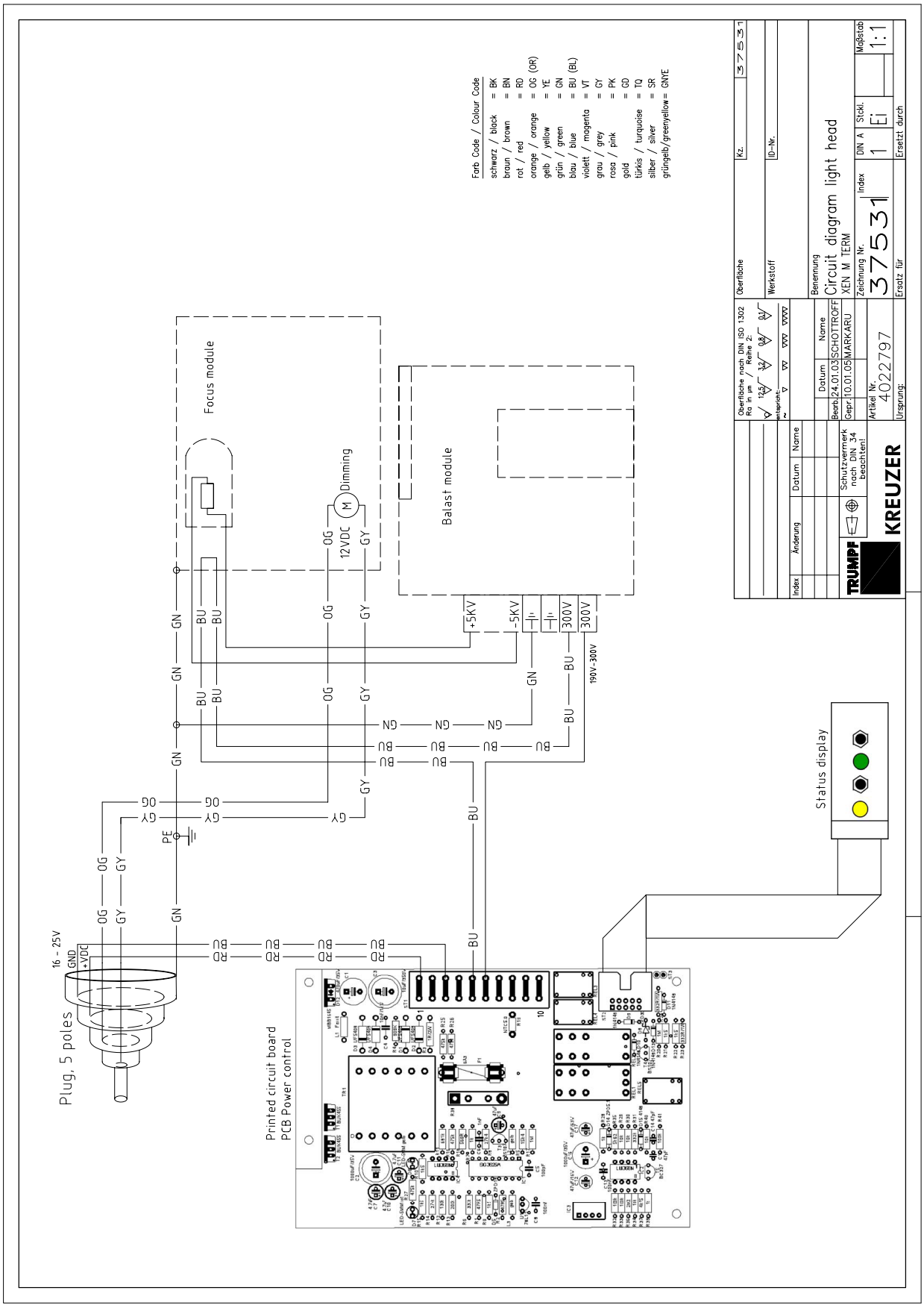
15.2 Circuit diagrams and set values (cont.)

15.2.23 XENION M light head



15.2 Circuit diagrams and set values (cont.)

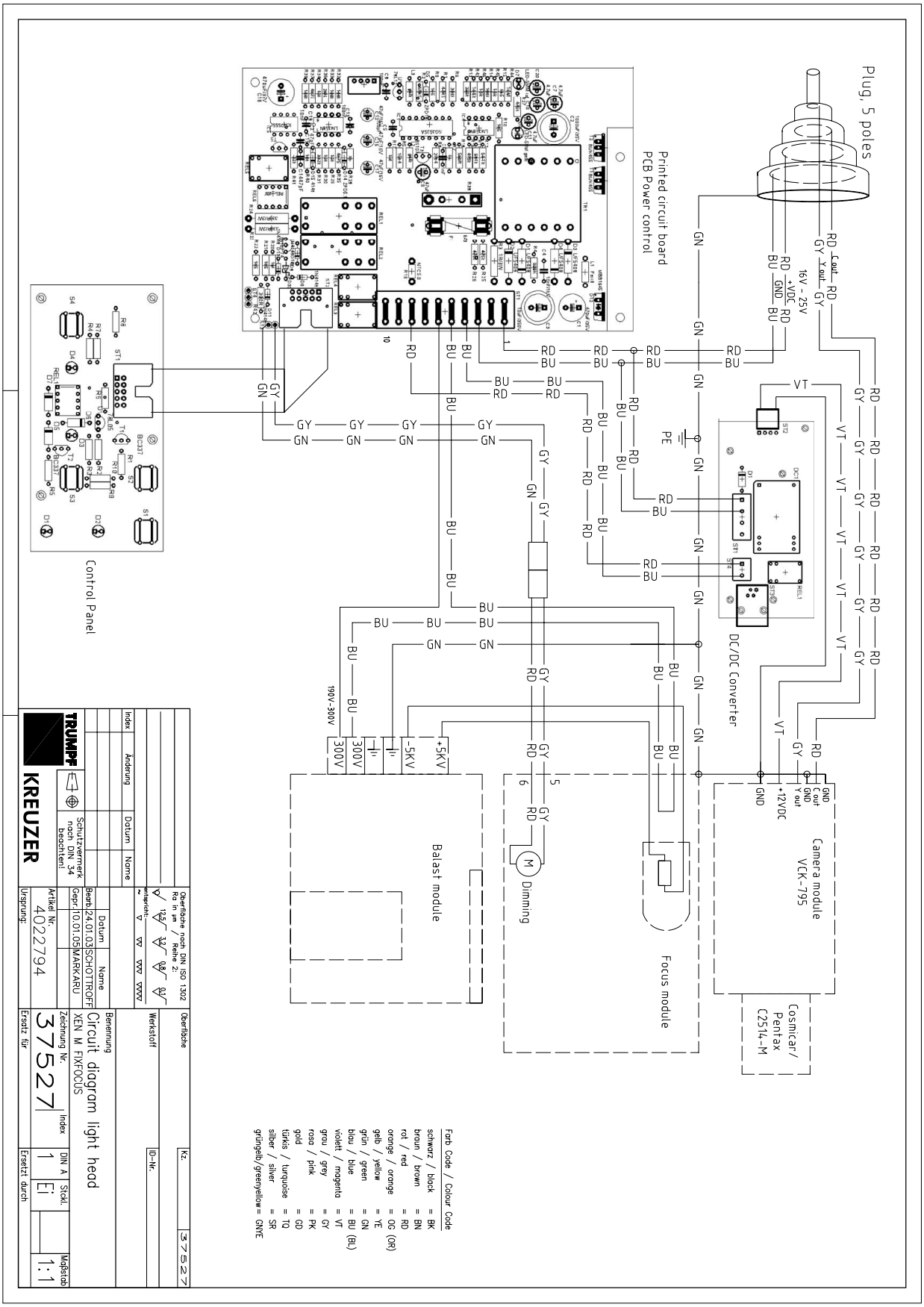
15.2.24 XENION M light head with wall control panel



15 Technical Description

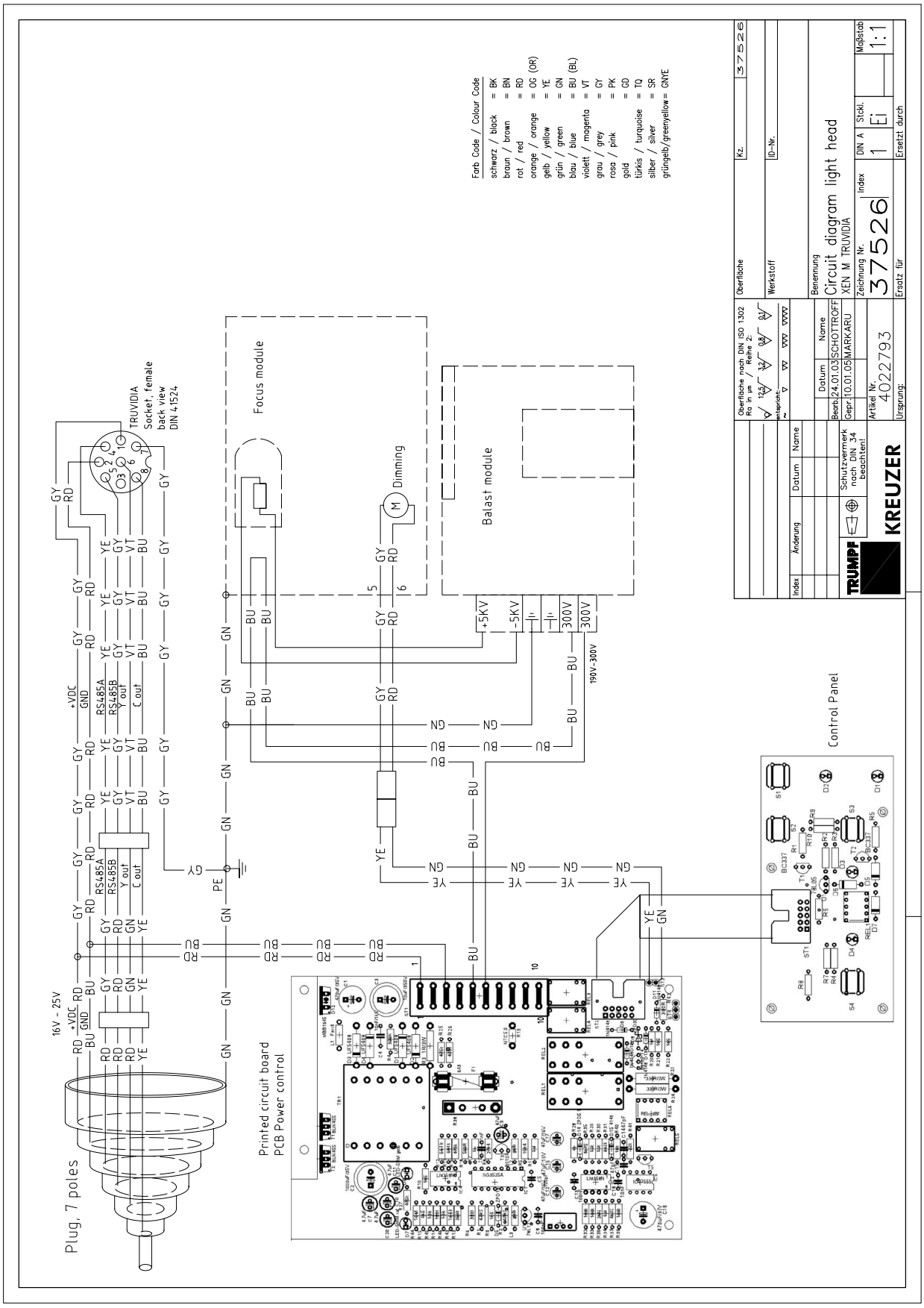
15.2 Circuit diagrams and set values (cont.)

15.2.25 XENION M light head with fixed focus camera



15.2 Circuit diagrams and set values (cont.)

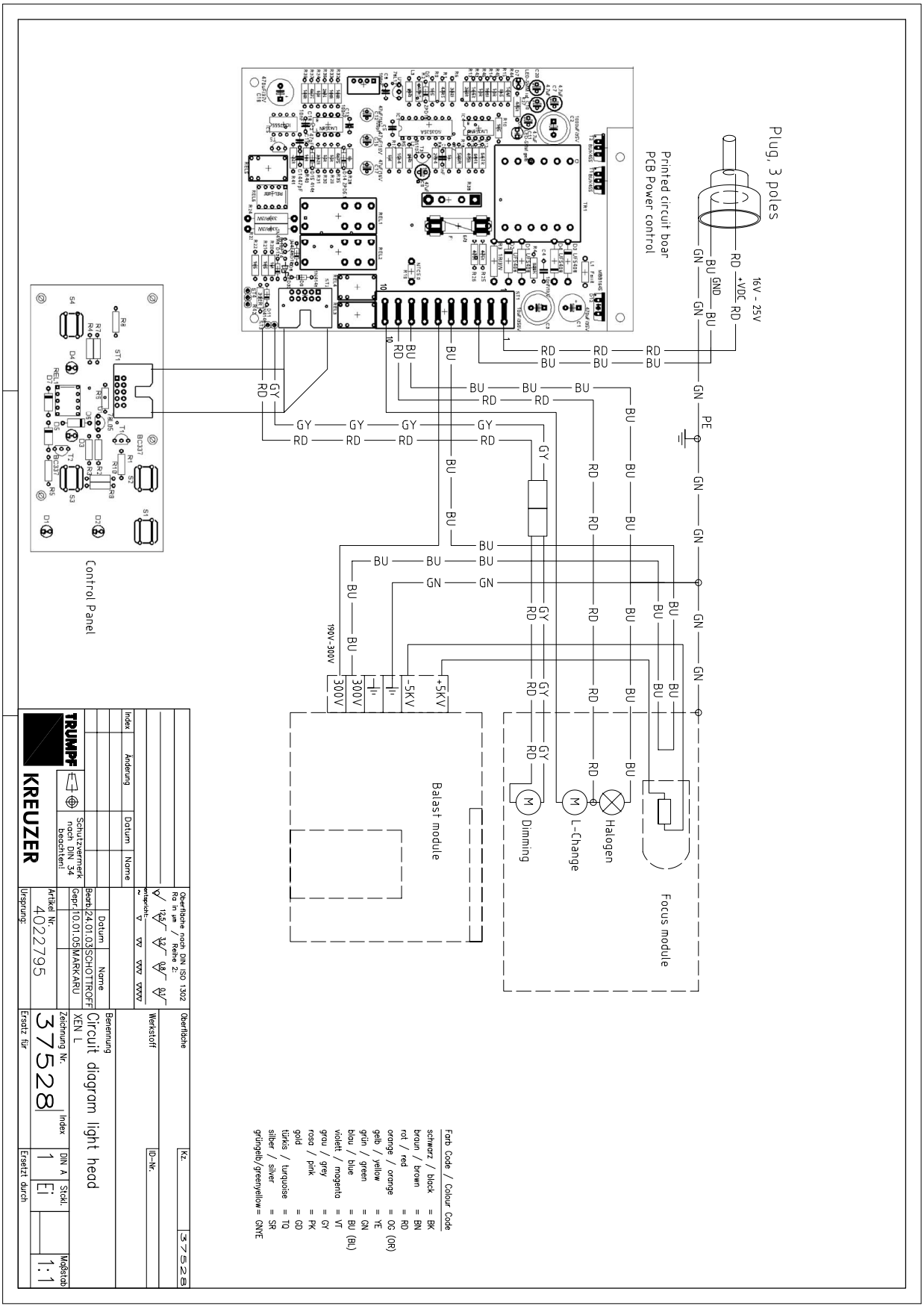
15.2.26 XENION M light head with TruVidia



15 Technical Description

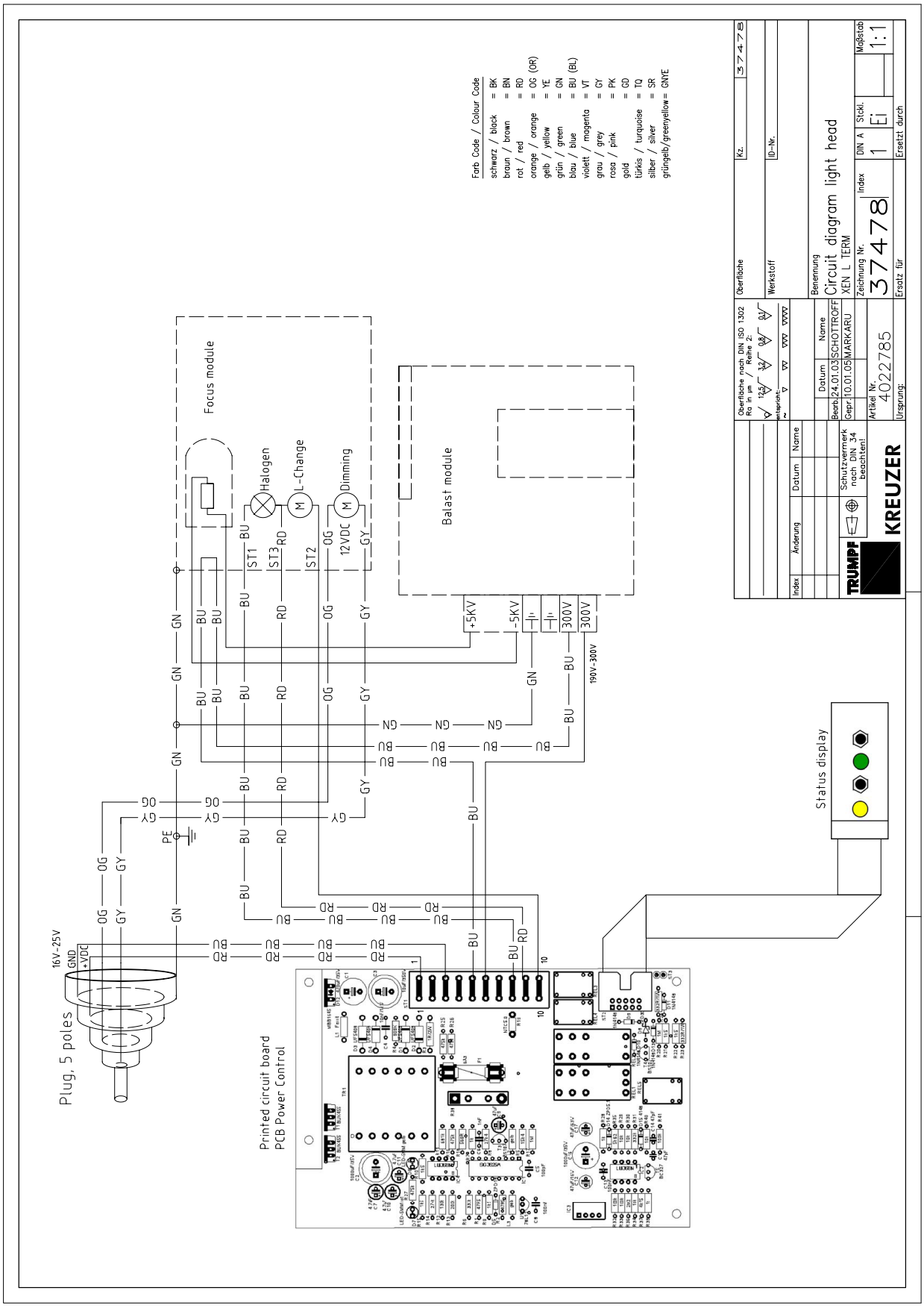
15.2 Circuit diagrams and set values (cont.)

15.2.27 XENION L light head



15.2 Circuit diagrams and set values (cont.)

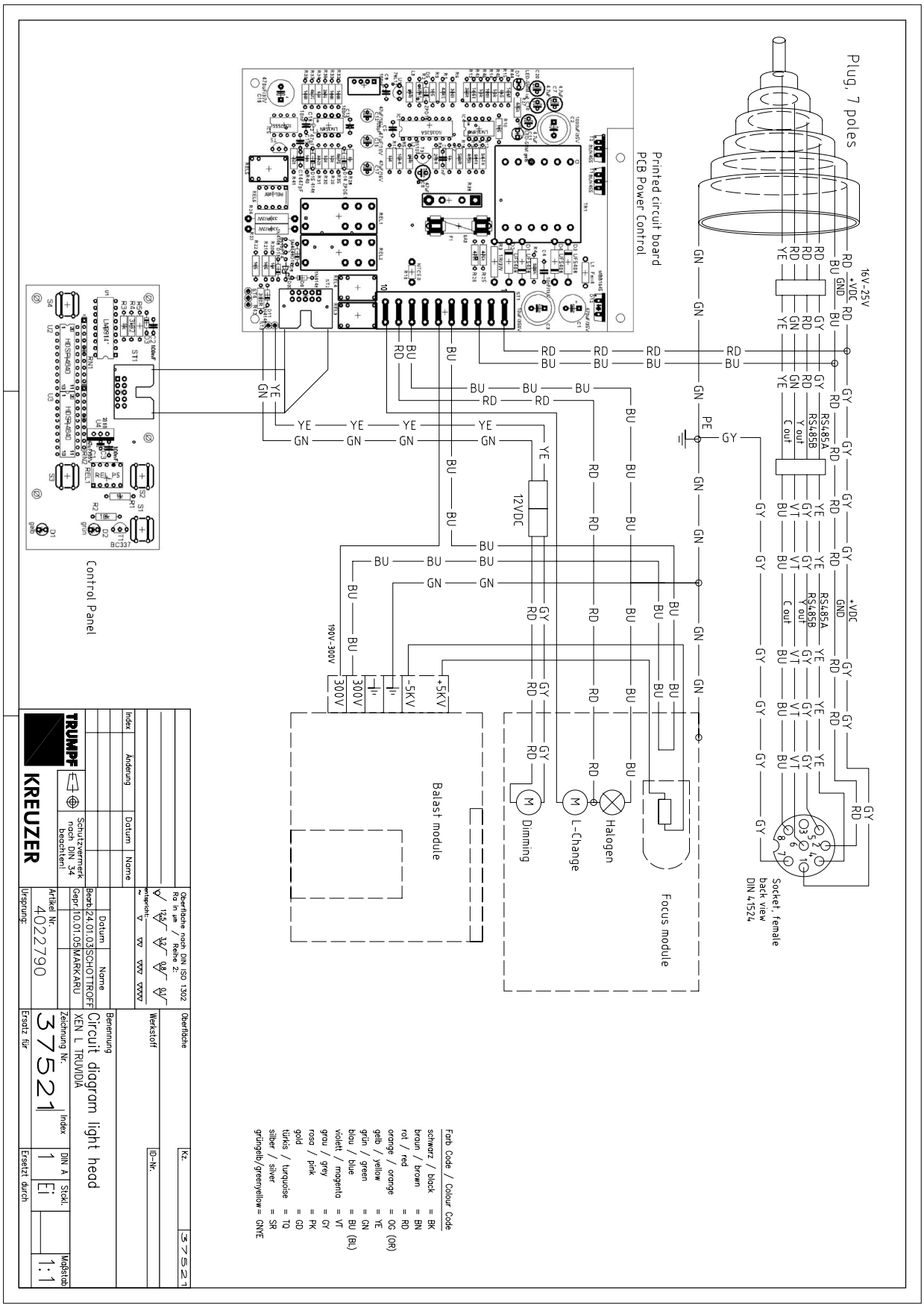
15.2.28 XENION L light head with wall control panel



15 Technical Description

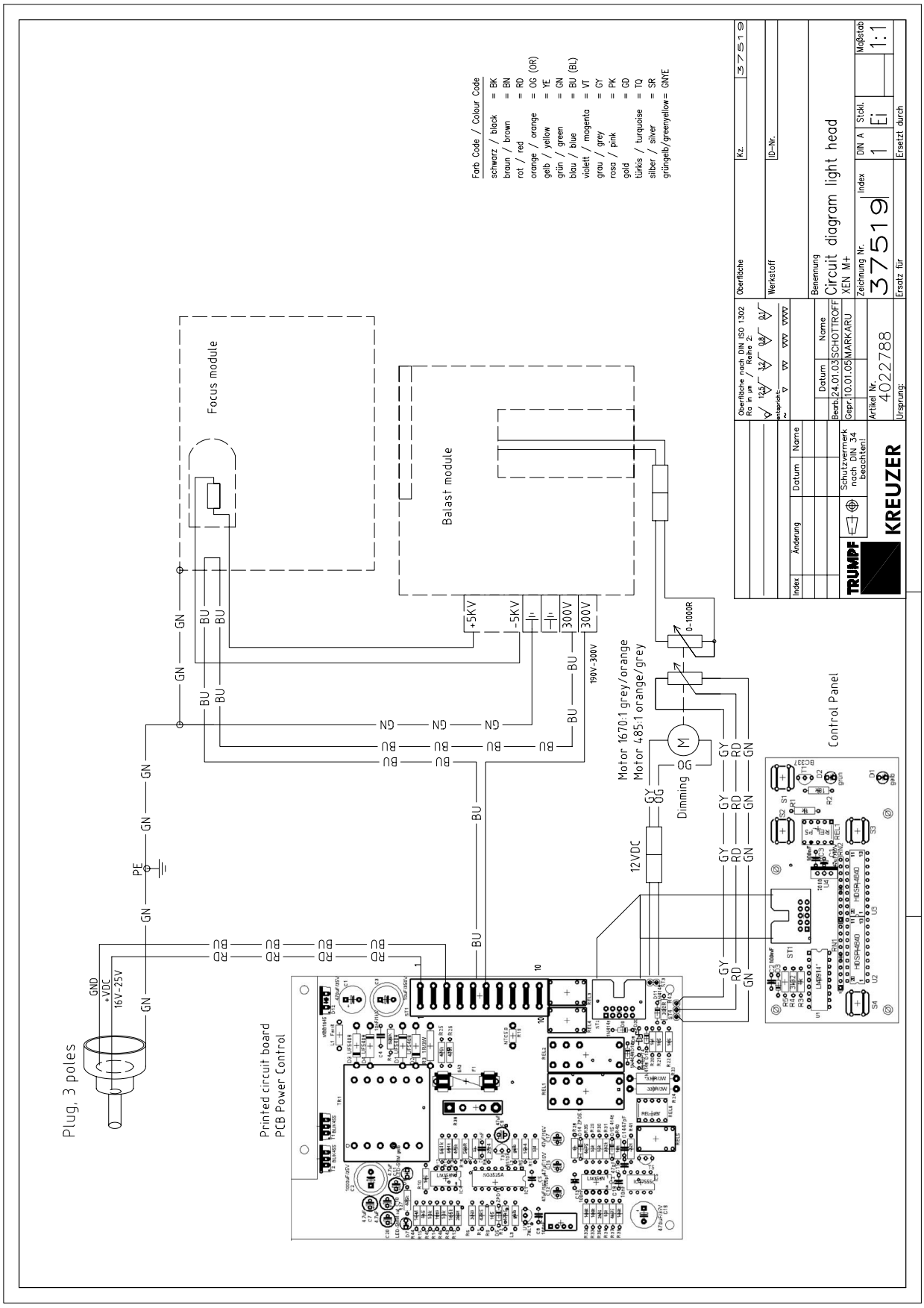
15.2 Circuit diagrams and set values (cont.)

15.2.29 XENION L light head with TruVidia



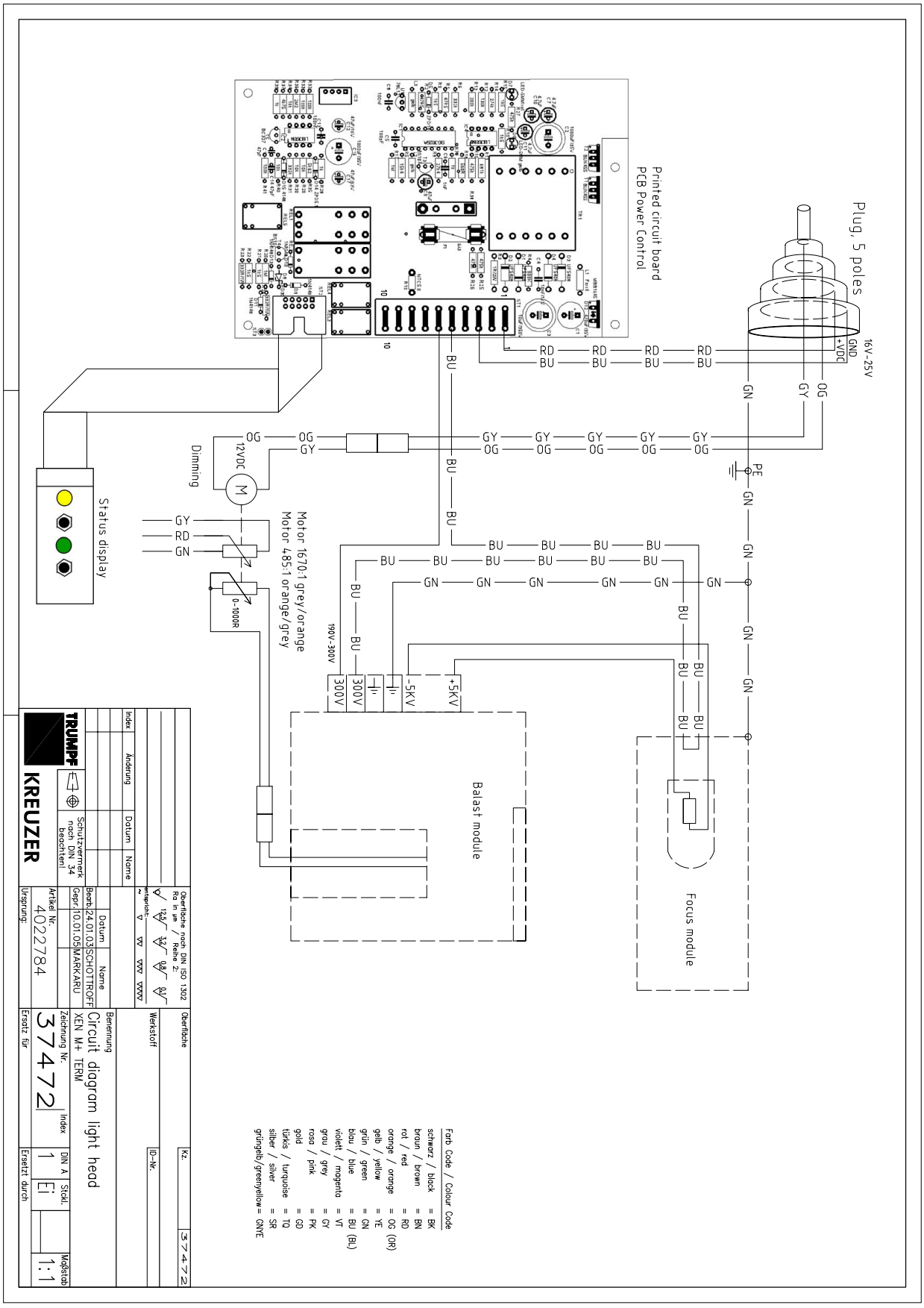
15.2 Circuit diagrams and set values (cont.)

15.2.30 XENION M+ light head



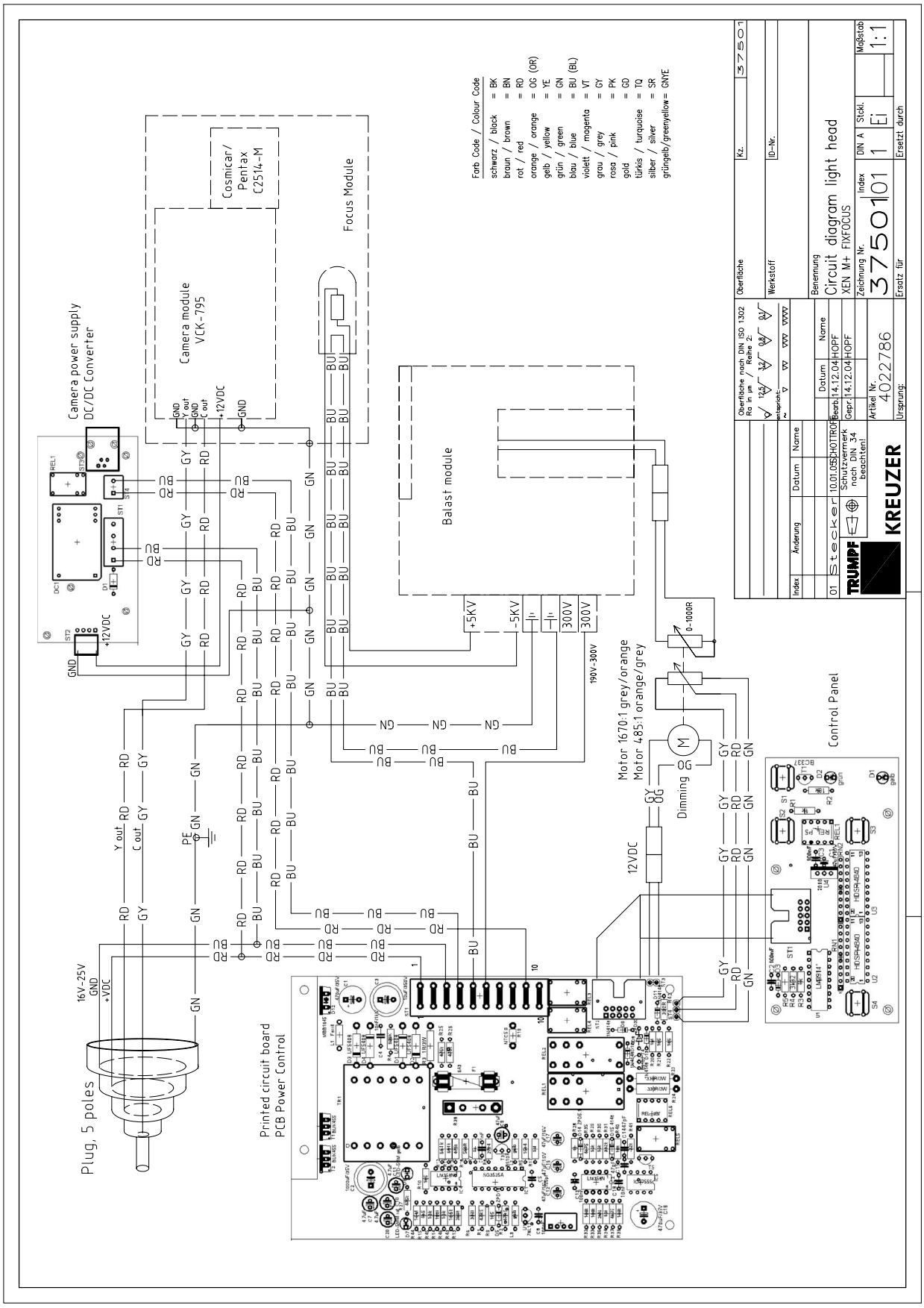
15.2 Circuit diagrams and set values (cont.)

15.2.31 XENION M+ light head with wall control panel



15.2 Circuit diagrams and set values (cont.)

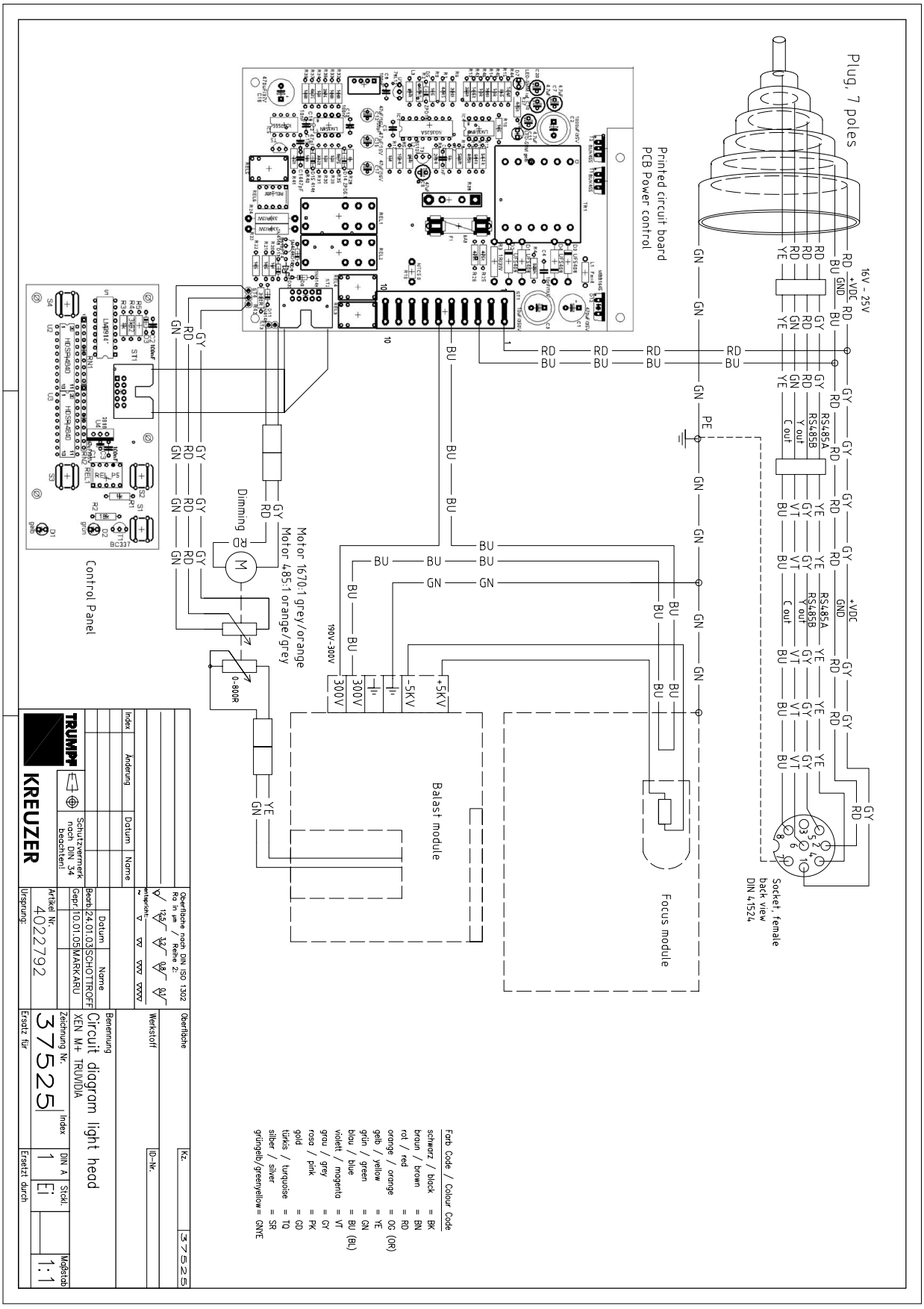
15.2.32 XENION M+ light head with fixed focus camera



15 Technical Description

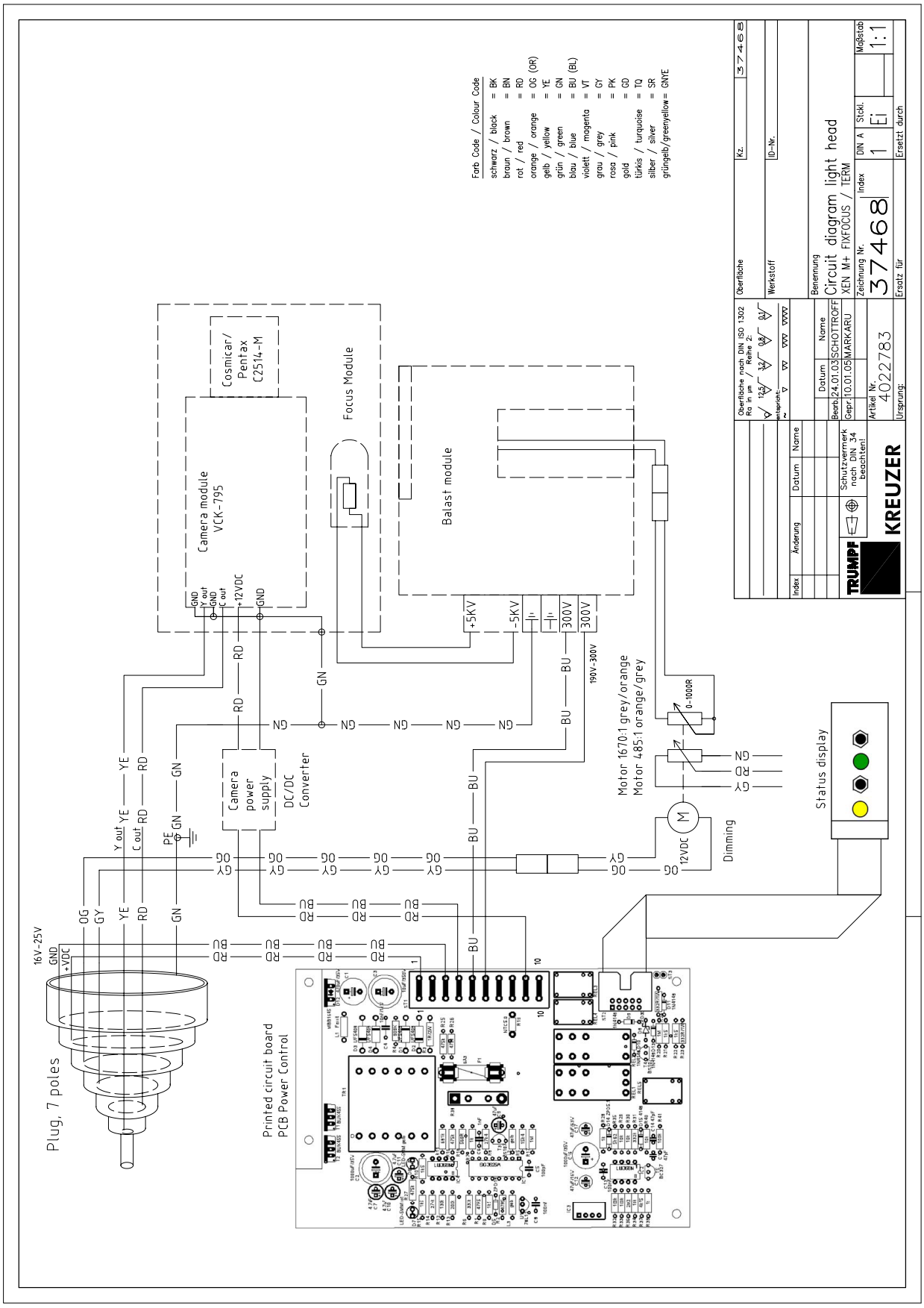
15.2 Circuit diagrams and set values (cont.)

15.2.33 XENION M+ light head with TruVidia



15.2 Circuit diagrams and set values (cont.)

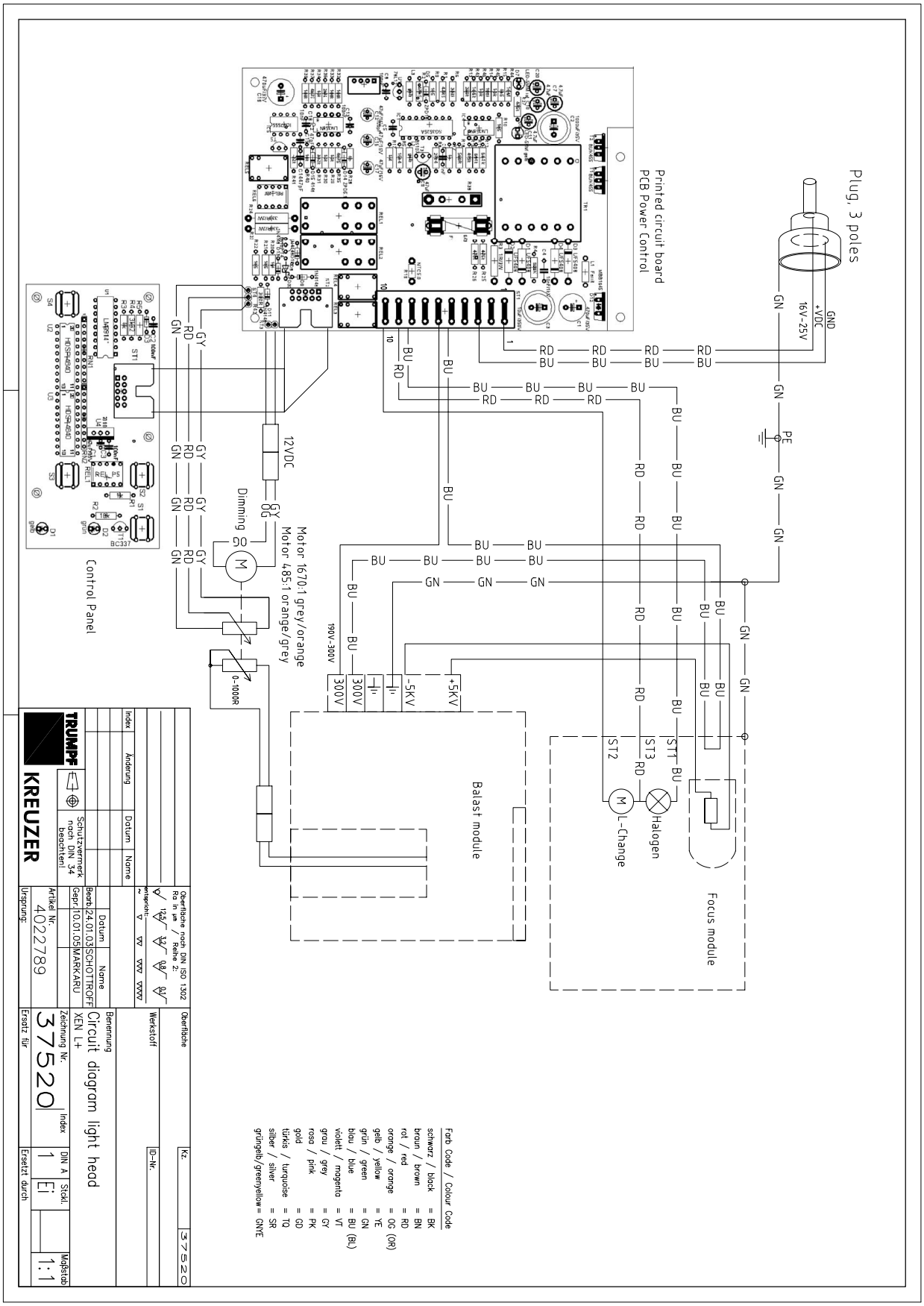
15.2.34 XENION M+ light head with fixed focus camera and wall control panel



15 Technical Description

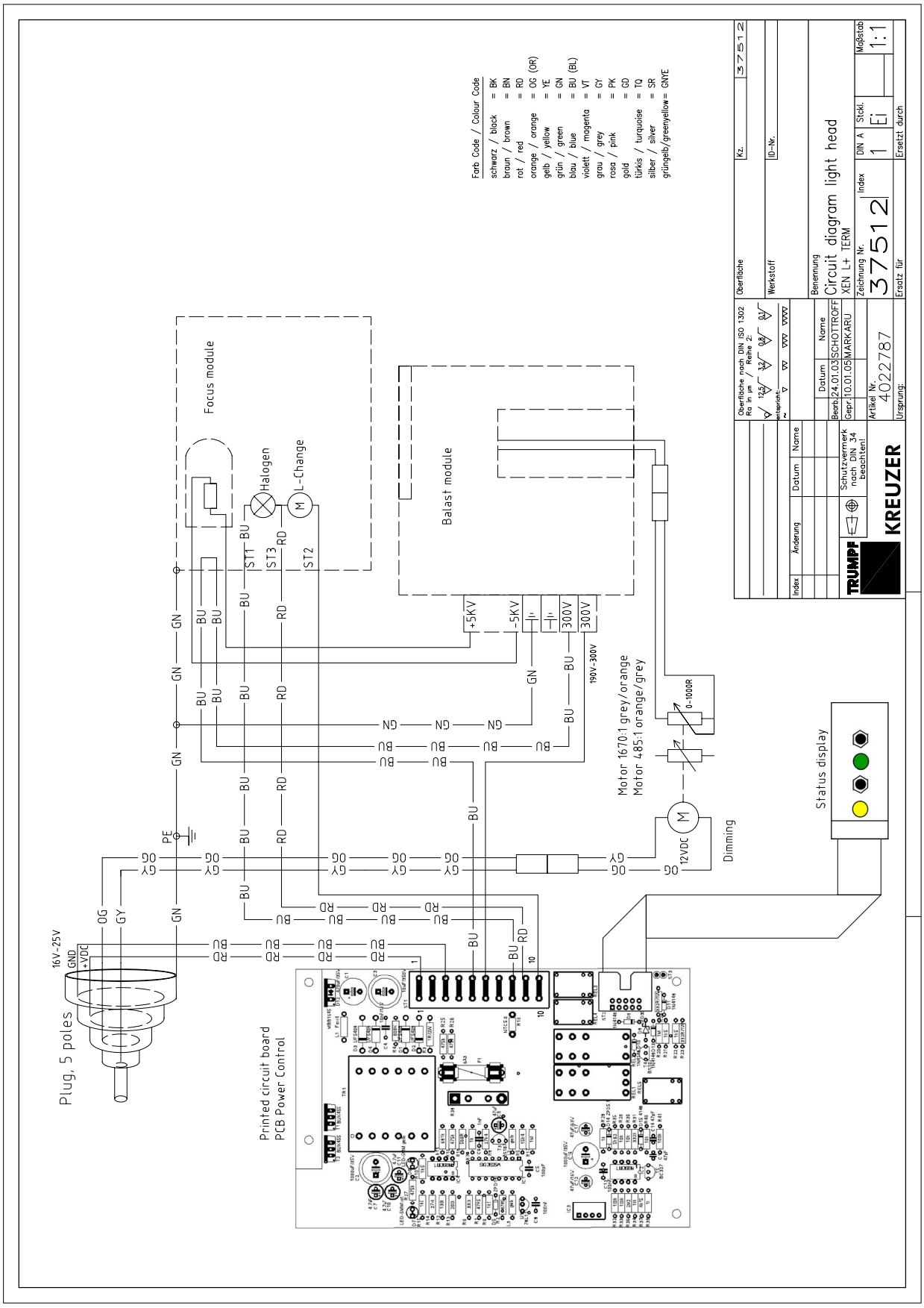
15.2 Circuit diagrams and set values (cont.)

15.2.35 XENION L+ light head



15.2 Circuit diagrams and set values (cont.)

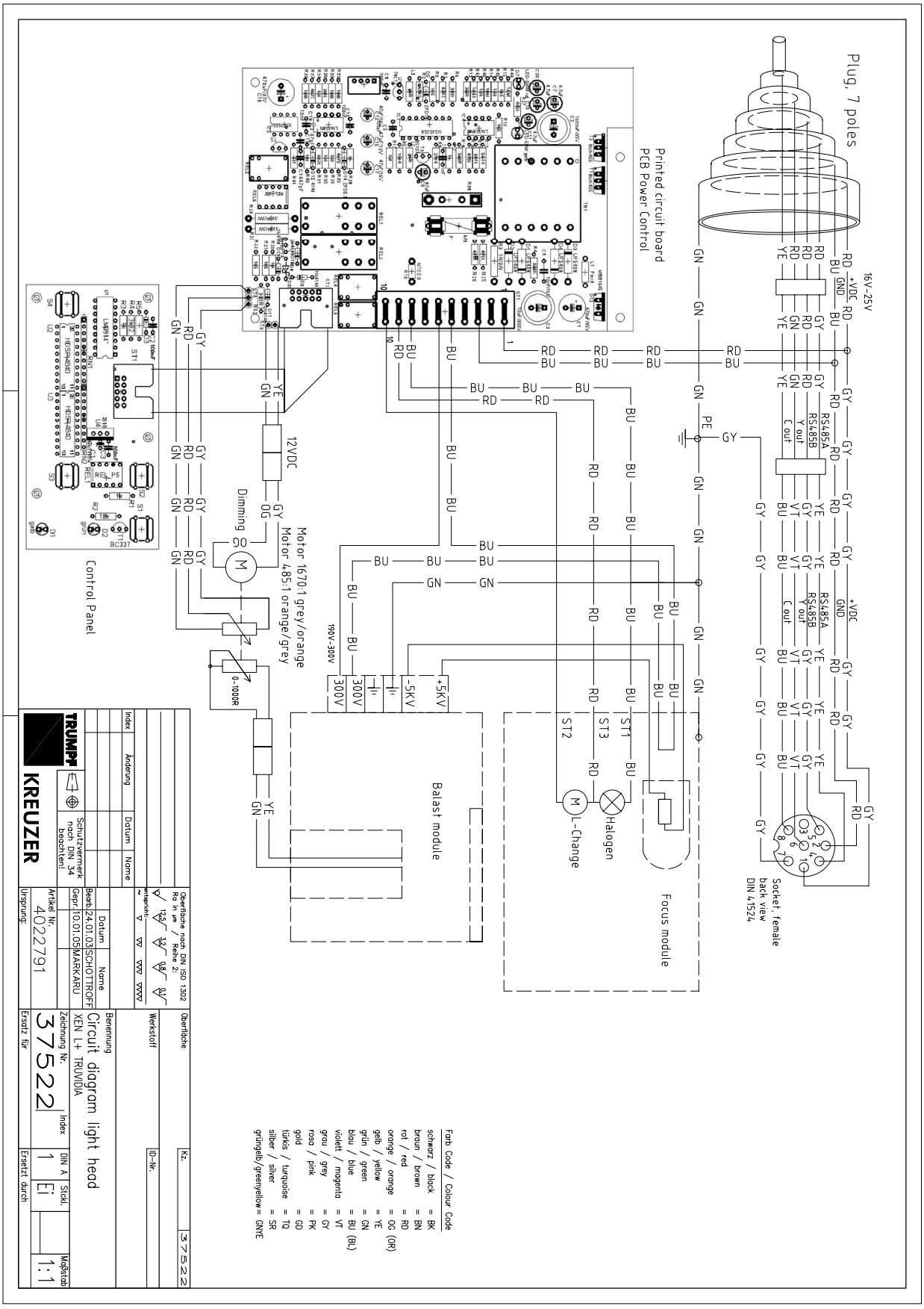
15.2.36 XENION L+ light head with wall control panel



15 Technical Description

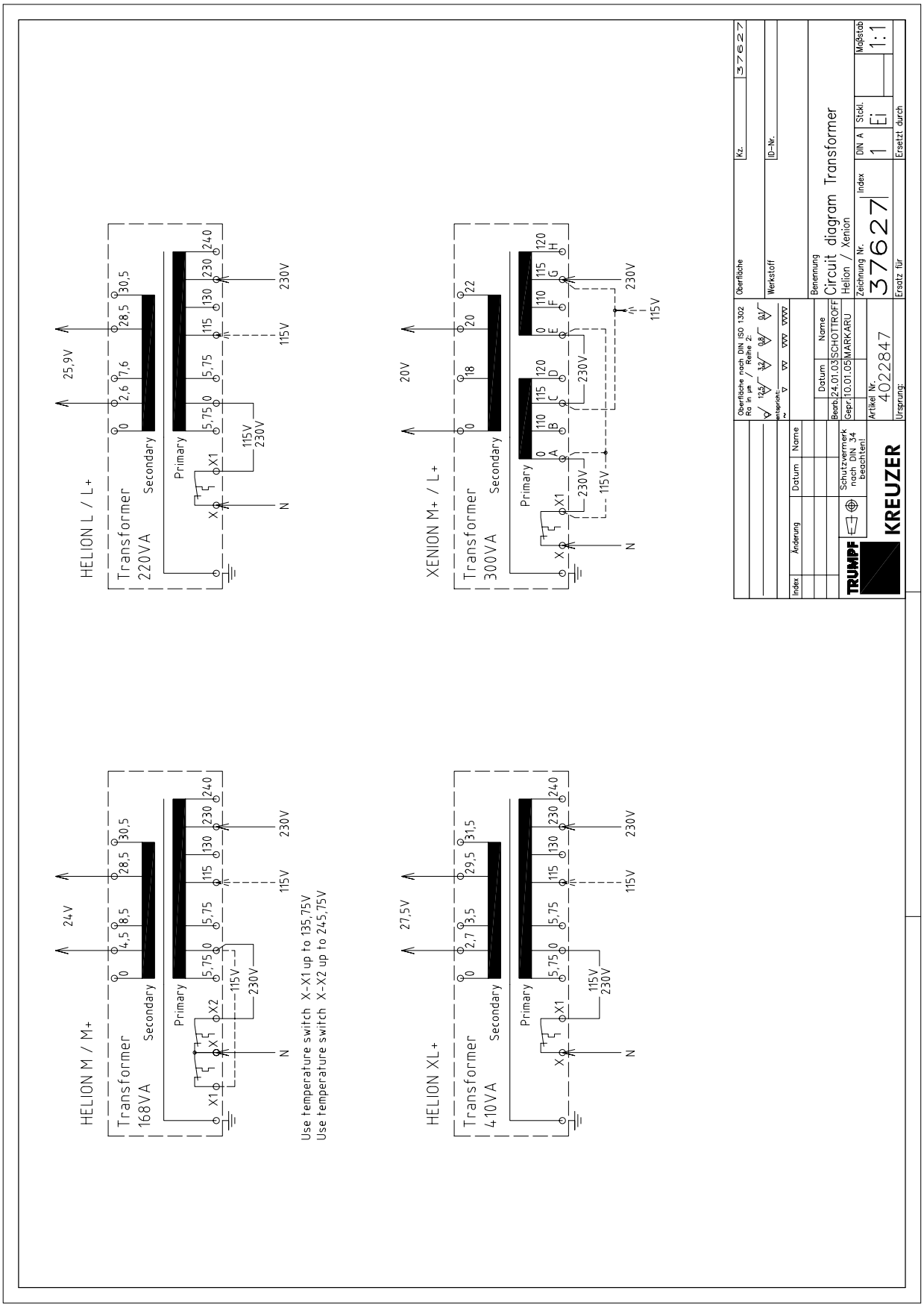
15.2 Circuit diagrams and set values (cont.)

15.2.37 XENION L+ light head with TruVidia



15.2 Circuit diagrams and set values (cont.)

15.2.38 HELION/XENION transformer connector



15.3 Test report

TRUMPF

TECHNICAL SAFETY INSPECTION / REPAIR PROTOCOL OP-LIGHTS

F 10.M41-00
Seite 1 / 1
TMS911li
2004-08-31

project _____ date: _____ page ____ of ____

repair ☐
technical safety inspection ☐

com.-nr: _____
room: _____

number of axis positions
☐ 1 ☐ 2 ☐ 3 ☐ 4

pos	product	type	hardware	software	constr. year	version	ser.-nr.	light intensity
1								
2								
3								
4								

pos	input V AC	input V DC	R_i in Ohm	V (DC) contactblock	V (DC) Focus	emergency switch over	default value	rem.
1							n. i. O.	
2							n. i. O.	
3							n. i. O.	
4							n. i. O.	

technical specifications		rem.	technical specifications		rem.
power loss transformer Ą contactblock	V		programming checked	☐	
all functions o.k.	☐		cross section [mm²]		
additional accessories - function	☐		bulb checked	☐	
air-handling ceiling	☐		control with operator panel (only on / off)	☐	
Check mounting stability	☐		with control panel (dimming)	☐	

Mounting place of transformer ☐ on ceiling tube ☐ on mounting plate ☐ electrical cabinet ☐ other

	remarks on positions

performed on	customer signature
field service name	department

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Lighting data	HELION S	HELION M	HELION M+
Central luminous intensity at a defined distance electrically dimmable from/to [%]	No	External dimmer required	40 - 100
Central luminous intensity at a defined distance [lx]	40.000	40.000 - 90.000	40.000 - 90.000
Focusable luminous field size d10 at distance of 1 m [mm]	180	140 - 200	140 - 200
Focusable luminous field size d50 at distance of 1 m [mm]	100	80 - 130	80 - 130
Colour temperature [K]	4.300	4.300	4.300
Colour rendering index [Ra (1-8)]	93	93	93
Red rendering index [R9]	approx. 45	approx. 60	approx. 60
Total radiation intensity at 100,000 Lux [W/m²]	343	350	350
Luminous efficacy of radiation [lm/m²]	290	285	285
Illumination depth without refocusing [L1 / L2]	730 / 730	320 / 880	320 / 880
Brightness of reserve light [%]	no reserve light	100	100
MODELLING: residual illumination with 1 shutter [%]	no stand. req.	10	10
MODELLING: residual illumination with 2 shutters [%]	no stand. req.	41	41
MODELLING: residual illumination with tube [%]	no stand. req.	100	100
MODELLING: residual illumination with tube and 1 shutter [%]	no stand. req.	10	10
MODELLING: residual illumination with tube and 2 shutters [%]	no stand. req.	41	41
Leneman laminar flow index	26	29	29
Oostlander laminar flow index	28	32	32

Electrical data	HELION S	HELION M	HELION M+
Transformer [mm/L x W x H]	78 x 68 x 93	105 x 99 x 109	105 x 99 x 109
Rated output of transformer [VA]	65	168	168
Supply voltage at transformer [V]	115/120/230/240	115/120/230/240	115/120/230/240
Maximum current consumption at 24 V DC [A]	4,2	5,5	6
Maximum current consumption at 230 V [A]	0,4	0,7	0,7
Maximum transformer permanent output [W]	75		
Voltage at ceiling fixture point [V]	13,2 (AC/DC)	24-26 (AC/DC)	24-30 (DC)
Ultimate voltage at lamp [V]	13,2	23	23
Rated output of lamp [W]	50	120	120
Rated voltage of lamp [V]	12	24	24
Effective service life of lamp [h]	2000	600-1000	600-1000
Power input of complete lamp [VA]	85	152	208
Voltage stability (corrected electronically)	none	yes	±0,1
Lamp-friendly soft start	no	yes	yes
Focus/luminous field memory	no	no	yes
Automatic lamp changeover	no	yes	yes
Electrics as per VDE and IEC	yes	yes	yes
Protection class as per MPG (Medical Devices Law)	I	I	I
Data for spare lamp	12V/50W	24V/120W	24V/120W
Spare lamp	8800097 [1 lamp]	8800200 [pack of 6 lamps]	8800200 [pack of 6 lamps]
Certification mark	CE · UL/CSA	CE · UL/CSA	CE · UL/CSA

Technical data
The technical data can be found in the data sheets in Section 15.1.

16 Technical Data (cont.)

Lighting data	HELION L	HELION L+	HELION XL+
Central luminous intensity at a defined distance electrically dimmable from/to [%]	External dimmer required	40 - 100	40 - 100
Central luminous intensity at a defined distance [lx]	50.000 - 140.000	50.000 - 140.000	60.000 - 145.000
Focusable luminous field size d10 at distance of 1 m [mm]	160 - 250	160 - 250	200 - 350
Focusable luminous field size d50 at distance of 1 m [mm]	83 - 165	83 - 165	104 - 175
Colour temperature [K]	4.300	4.300	4.300
Colour rendering index [Ra (1-8)]	93	93	93
Red rendering index [R9]	ca. 60	ca. 60	ca. 60
Total radiation intensity at 100,000 Lux [W/m²]	355	355	355
Luminous efficacy of radiation [lm/m²]	282	282	282
Illumination depth without refocusing [L1 / L2]	430 / 750	430 / 750	340 / 900
Brightness of reserve light [%]	100	100	100
MODELLING: residual illumination with 1 shutter [%]	40	40	64
MODELLING: residual illumination with 2 shutters [%]	41	41	53
MODELLING: residual illumination with tube [%]	100	100	87
MODELLING: residual illumination with tube and 1 shutter [%]	40	40	50
MODELLING: residual illumination with tube and 2 shutters [%]	41	41	42
Leneman laminar flow index	28	28	93
Oostlander laminar flow index	32	32	119

Electrical data	HELION L	HELION L+	HELION XL+
Transformer [mm/L x W x H]	120 x 103 x 118	120 x 103 x 118	120 x 135 x 118
Rated output of transformer [VA]	220	220	410
Supply voltage at transformer [V]	115/120/230/240	115/120/230/240	115/120/230/240
Maximum current consumption at 24 V DC [A]	6,6	7,5	13,5
Maximum current consumption at 230 V [A]	0,9	1,2	1,6
Maximum transformer permanent output [W]	185	195	375
Voltage at ceiling fixture point [V]	24-26 (AC/DC)	24-30 (DC)	24-30 (DC)
Ultimate voltage at lamp [V]	23	23	23
Rated output of lamp [W]	150	150	250
Rated voltage of lamp [V]	24	24	24
Effective service life of lamp [h]	600-1000	600 - 1000	600-1000
Power input of complete lamp [VA]	205	210	310
Voltage stability (corrected electronically)	yes	±0,1	±0,1
Lamp-friendly soft start	yes	yes	yes
Focus/luminous field memory	no	yes	yes
Automatic lamp changeover	yes	yes	yes
Electrics as per VDE and IEC	yes	yes	yes
Protection class as per MPG (Medical Devices Law)	I	I	I
Data for spare lamp	24V/150W	24V/150W	24V/250W
Spare lamp	8800100 [pack of 6 lamps]	8800100 [pack of 6 lamps]	8800250 [pack of 6 lamps]
Certification mark	CE · UL/CSA	CE · UL/CSA	CE · UL/CSA

Technical data
The technical data can be found in the data sheets in Section 15.1.

Lighting data	XENION M+	XENION L+
Central luminous intensity at a defined distance electrically dimmable from/to [%]	60 - 100	60 - 100
Central luminous intensity at a defined distance [lx]	60.000 - 120.000	60.000 - 160.000
Focusable luminous field size d10 at distance of 1 m [mm]	180 - 240	190 - 270
Focusable luminous field size d50 at distance of 1 m [mm]	90 - 180	95 - 150
Colour temperature [K]	4.300	4.300
Colour rendering index [Ra (1-8)]	94	94
Red rendering index [R9]	ca. 65	ca. 65
Total radiation intensity at 100,000 Lux [W/m²]	342	344
Luminous efficacy of radiation [lm/m²]	291	291
Illumination depth without refocusing [L1 / L2]	365 / 935	410 / 1010
Brightness of reserve light [%]	none	81
MODELLING: residual illumination with 1 shutter [%]	10	40
MODELLING: residual illumination with 2 shutters [%]	41	41
MODELLING: residual illumination with tube [%]	100	100
MODELLING: residual illumination with tube and 1 shutter [%]	10	40
MODELLING: residual illumination with tube and 2 shutters [%]	41	41
Leneman laminar flow index	9	10
Oostlander laminar flow index	10	11

Electrical data	XENION M+	XENION L+
Power supply unit [mm/L x W x H]	199 x 110 x 50	125,5 x 125,2 x 100
Rated output of power supply unit [VA]	156	240
Supply voltage at power supply unit [V]	88 - 132 / 176 - 240	85 - 240
Maximum current consumption at 24 V DC [A]	6,5 (start phase)	10 (start phase)
Maximum current consumption at 230 V [A]	3,2 (start phase)	3,5 (start phase)
Maximum transformer permanent output [W]	156	240
Voltage at ceiling fixture point [V]	24-26 (DC)	24-26 (DC)
Ultimate voltage at lamp [V]	70	70/24
Rated output of lamp [W]	70	70/120
Rated voltage of lamp [V]	90	90/24
Effective service life of lamp [h]	5000	5000
Power input of complete lamp [VA]	170	170
Voltage stability (corrected electronically)	none	none
Lamp-friendly soft start	yes	yes
Focus/luminous field memory	yes	yes
Automatic lamp changeover	no	yes
Electrics as per VDE and IEC	yes	yes
Protection class as per MPG (Medical Devices Law)	I	I
Data for spare lamp	90V/70W	90V/70W + 24V/120W
Spare lamp	8800095 [1 lamp]	8800095 [1 lamp]
Certification mark	CE · UL/CSA	CE · UL/CSA

Technical data
The technical data can be found in the data sheets in Section 15.1.

16 Technical Data (cont.)

Noise level acc. to EN 793: 1998
Sound energy levels > 30 db(A) (EN ISO 3744) are not exceeded

Classification acc. to EC Medical Device Directive dated 14 June 1993: 93/42/EEC:
Protection class: I
Protection level: Type B
Protection type: covered design Standard device (closed device without protection from ingress of water)
The lighting system is not designed for operation in potentially explosive atmospheres.
The lighting system is suitable for continuous operation.

Applicable regulations
DIN EN 60601-1 (VDE 0750 part 1)
DIN EN 60601-1:1998 + A1:1991 + A2:1995
DIN EN 793: 1998 (VDE 0750 part 211)
UL60601-1 1st: "CSA C22.2 No. 601.1"

Approvals for standard version
The product has been tested and certified by the Testing and Certification Institute (EU code no. 0123). The marks licensing certificate entitles the device to bear the CE mark showing the number of the notified body 0123.

EC Conformity
The HELION® and XENION® lighting systems comply with the provisions of the Directive 93/42/EEC (Medical Device Directive). If other lamps are connected to the TRUMPF KREUZER lighting sytem a new conformity assessment must be issued. Installation of the lamps on a lighting system not specified above must be clarified with TRUMPF KREUZER. A new conformity assessment must be issued.

Combination with other medical devices
The ceiling-mounted support system is provided with equipment (e.g. monitor, etc) from other manufacturers. Please refer to the operating instructions of these manufacturers for the information necessary for operation.

CE 0123
TÜV Product Service, Munich, Germany, EC code number: 0123

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7200791 Service Manual for the HELION® XENION® Surgical Lighting System GB